# GSM datalogger DA4
## USER´S GUIDE

ISO 9001:2001

# Contents

1.SAFETY INSTRUCTIONS....4
2.DESCRIPTION OF THE GSM DATALOGGER DA4 ....5
2.1. General....5
2.2. Examples of possible applications....5
2.3. Compatibility with other Conel company modems....6
2.4. Description of GSM Datalogger DA4 components....6
2.4.1.GSM module ....6
2.4.2.Control microprocessor....6
2.4.3.User interface protocols....7
2.4.4.Sleep mode....7
2.5. Technical parameters ....8
2.6. GSM Datalogger DA4 status indication....9
2.7. User interfaces (connectors)....10
2.7.1.PORT1 connector - RS232....11
2.7.2.PORT2 connector - CNT....13
2.7.2.1.Analogy input....14
2.7.2.2.Binary input....14
2.7.2.3.Counter input....14
2.7.2.4.Binary output....14
2.7.3.PWR supply connector....16
2.7.3.1.Analogy input....17
2.7.3.2.Binary output....17
2.7.3.3.Output signal for disconnection of supply voltage....17
2.7.3.4.GSM Datalogger DA4 signals measuring....17
2.7.3.5.I/O signals parameters....18
2.7.3.6.Settings CIO parameters....18
2.7.3.7.Connecting CIO signals to user device....18
2.7.4.PWR supply connector....21
2.7.5.Antenna connection....23
2.8. Technical specifications of port 2....24
2.9. GSM Datalogger DA4 settings....25
2.10. Service cable....25
2.11. XC-CNT protocol....26
2.12. Available communication protocols....26
2.13. Recommended settings for testing....27
2.14. XC-CNT/RDS92 protocol description....27
2.15. XC-CNT/MODBUS RTU master protocol description....34
2.16. XC-CNT/MODBUS RTU slave protocol description....36
2.17. XC-CNT/IEC 60870-5-104 protocol description....39
2.18. XC-CNT/myIO protocol description....41
2.19. XC-CNT/SMS protocol description....41
2.20. Standard accessories....42
2.21. Additional accessories....43
2.22. Assembly procedure....44
2.23. Mechanical external dimensions and mounting recommendations ....46
2.24. Product marking....49
2.25. GSM Datalogger DA4 production label ....50
2.26. Production label of interfaces PORT2....50
3.SWITCH BOARDS....51
4.CONFIGURATION SETTING....52

4.1. The basic configuration of the GSM Datalogger DA4....53
4.2. External protocol XC-CNT configuration....57
4.3. GSM Datalogger DA4 monitoring....59
4.4. Upload firmware to GSM Datalogger DA4....61
4.5. Programming XC-CNT firmware....64
5.QUALITY OF THE GPRS SIGNAL....66
5.1. Antenna installation for modems....66
5.2. Good quality GPRS requirements:....66
5.3. Example, station received these signals:....66
5.4. Method of signal measurements....67
5.5. AT^MONI command meaning....67
5.6. AT^MONP command meaning....68
6.OPTICAL SENSORS INSTALLATION....69
6.1. Flowmeter WP, WS type....69
6.2. Flowmeter WPD, WSD type....69
7.REFERENCES....70
8.LINKS TO RELATED PRODUCTS OF THE MANUFACTURER....70
8.1. Systems....70
8.2. Protocols....70
8.3. Software....70
8.4. Products....70
9.PRODUCT DISPOSAL INSTRUCTIONS....71
10.COMPLAINTS PROCEDURE....72
11.WARRANTY....74

## Symbols used

Danger – important notice, which may have an influence on the user's safety or the function of the device.

Attention – notice on possible problems, which can arise to in specific cases.

Information, notice – information, which contains useful advices or special interest.

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# 1. Safety instructions

***Please observe the following safety instructions:***

- The GSM Datalogger DA4 must be used in compliance with all applicable international and national laws and in compliance with any special restrictions regulating the utilization of the communication module in prescribed applications and environments .
- Use only the original Conel company accessories. Thus you will prevent possible health risks and damage to the devices and ensure compliance with all relevant provisions. Unauthorised adjustments or use of unapproved accessories may result in damage to the GSM Datalogger DA4 and breach of applicable laws. Use of unapproved adjustments or accessories may lead to cancellation of guarantee, which has no effects on your legal rights.
- You are not allowed to open the GSM Datalogger DA4. Only SIM-card replacement is allowed.
- **Caution!** The SIM card could be swallowed by small children .
- Voltage on the GSM Datalogger DA4 supply connector shall not be exceeded.
- **Caution!** Do not connect power supply connector to the port connector PORT1 or PORT2, it could be damage this ports.
- Do not expose the GSM Datalogger DA4 to extreme conditions. Protect it from dust, moisture and heat.
- It is recommended not to use the GSM Datalogger DA4 at petrol stations. We remind users to observe the limitations of radio devices use at pump stations, chemical plants or where explosives are being used.
- Switch the GSM Datalogger DA4 off in a air plane. Use of the GSM Datalogger DA4 may endanger plane's functions, interfere with mobile network and be illegal. By not following these instructions the customer risks cancellation or termination of telephone services, prosecution or both.
- You have to be extremely careful when using the GSM Datalogger DA4 in proximity to medical devices, such as pacemakers or hearing aids.
- Close to TV sets, radios and PCs the GSM Datalogger DA4 may cause interference.
- It is recommended to create proper copy or backup of all the important settings saved in the device's memory.

# 2. Description of the GSM Datalogger DA4

## *2.1. General*

Telemetric arrangement GSM Datalogger DA4 is low power arrangement for gathering in premises and objects, where reticular power supply isn't accessible. It is possible him easily put through with control centre, where it is possible adjust characteristics, switch GSM Datalogger DA to the online mode or also observe state of given object.

The GSM Datalogger DA4 sends messages about technology status and log history in setting time. With dispatching or next equipment the DA4 communicates by inbuilt MC39i modem of the SIEMENS company with GSM–GPRS choice or SMS mode. The GSM Datalogger DA4 sends warning messages at time, for example: at settings limits overrun – flow overrun etc. In case that it isn't data to send, the GSM Datalogger DA4 is in sleep mode, this is easy in term of battery energy saving.

GSM Datalogger DA4 is a wireless data transmission device. The GSM Datalogger DA4 is one of the basic elements of AGNES GPRS system. The system AGNES characteristics are described in reference **[1]**. GSM-GPRS infrastructure is used for the wireless communication as a line layer. ARNEP protocol is implemented above the line layer. The protocol ARNEP is described in reference **[2]**. On its basis the modules create virtual private data network where data can be transferred between user devices via any protocols.

One may simply imagine the GSM Datalogger DA4 as a protocol converter between the user device (PLC automatic, PC, data terminal, etc.) and GSM-GPRS infrastructure of a mobile network operator. In fact the device is much more complicated, as it provides the user with possibility to communicate simply between all the systems. Apart from data transfers via GPRS the GSM Datalogger DA4 enables SMS.

The radio component GSM-GPRS is built in the GSM Datalogger DA4, consisting of MC39i OEM module SIEMENS.

GSM Datalogger DA4 is controlled by communication 32-bit microprocessor. It ensures GSM-GPRS communication, data transfer on serial user interfaces and a number of diagnostic and service features. GSM Datalogger DA4 has one serial user interface (communication port) RS232, one user interface for direct connection of inputs and outputs for data collection and technological process management (communication port) CNT which processes data and in sleep mode and one interface for direct connection of inputs and outputs (CIO) which processes data in operate mode only. As a result you may communicate with various user interfaces using different communication protocols on serial interface.

## *2.2. Examples of possible applications*

The typical mounting of GSM datalogger can be:

- Observation of pressure, flow, surface.
- Isolator high tension.
- Observation of statics construction.
- Commentary from seismographs.
- Metering of atmosphere cleanness.
- Reading of several flow meters on one’s bus MBUS in housing houses and in shafts with more flow meters.
- Possibility to parameter setting or switch to the online mode from control centre.

## 2.3. Compatibility with other Conel company modems

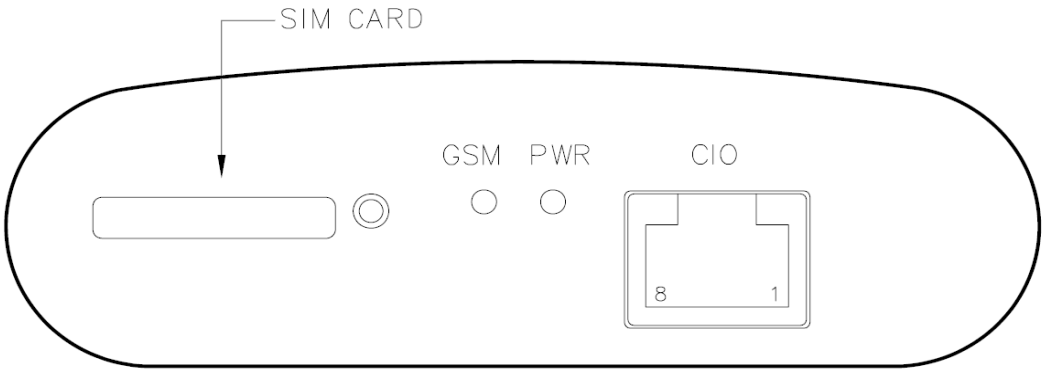
Regarding the communication and data transfers the GSM Datalogger DA4 is compatible with the CGU 04i type and older CGU 04. This means it is possible to combine all types in one network and simply extend an existing network of CGU 04i modules with new communication points using GSM Datalogger DA4s. The GSM Datalogger DA4 provides some features which is not included in the CGU 04i type.

User and industrial communication protocol implemented on serial interfaces are compatible with the protocols used for Conel radio modems (e.g. CDA 70). You may establish complex combined data networks consisting of radio, Ethernet and GPRS modems.

## 2.4. Description of GSM Datalogger DA4 components

### 2.4.1. GSM module

SIEMENS MC39i OEM module is used for GSM network wireless communication. It is integrated into printed circuit board. FME antenna connector is accessible from the back panel. Release SIM card reader is located on the front panel.




The MC39i module communicates in three GSM bands (900 MHz, 1800 MHz and 1900 MHz). It can transmit in two „Time Slots“ and receive in four (GPRS multi-slot class 10 – maximum reception bit speed 85.6 kb/s). It supports CS-1, CS-2, CS-3 and CS-4 encryptions).

### 2.4.2. Control microprocessor

Thirty-two-bit microprocessor Freescale Coldfire with 1 MB SRAM backup memory, 512 kByte FLASH EEPROM memory and realtime circuit with reserve power supply makes for the basis of GSM Datalogger DA4 control microprocessor. Software is based on realtime operating system that processes simultaneous tasks. Thus parallel operation of all external interfaces of the datalogger is maintained.

The microprocessor is connected through serial interface to MC39i OEM module and controls the communication via GSM-GPRS. Towards a user it is connected on serial interfaces RS 232 (PORT1), interfaces CNT (PORT2) for direct signals processing circuits, and CIO interface.

In case other than RS232 interface device needs to be connected, e.g. RS485/422, it is possible to connect level converter to the serial port according to particular application. The microprocessor can control such external converter.

The microprocessor further manages numerous functions of servicing, diagnostic and installation purposes. Data transfer statistics, separate port communications, power blackouts, voltage of the reserve supply, GSM Datalogger DA4 temperature and other important information – everything is recorded in the microprocessor's memory.

GSM Datalogger DA4 settings are saved in FLASH EEPROM memory. Service SW RADWIN is designed for GSM Datalogger DA4 configuration. The description of programme RADWIN is in reference **[3]**.

### 2.4.3. User interface protocols

There are numerous industrial protocols implemented on the PORT1 interface:

- ARNEP UI
- MBUS
- MODBUS
- transparent LINE
- AT modem
- SAUTER
- IWKA
- SBUS
- RADOM
- RDS CONEL

On the PORT2 interface are implemented protocols:

- XC-CNT/RDS92
- XC-CNT/MODBUS RTU master
- XC-CNT/MODBUS RTU slave
- XC-CNT/IEC 60870-5-104
- XC-CNT/myIO
- XC-CNT/SMS

New protocols, not supported by the datalogger yet, can be implemented according to the customer's needs. GSM Datalogger DA4 also enables the implementation of own user protocol directly by the customer.

### 2.4.4. Sleep mode

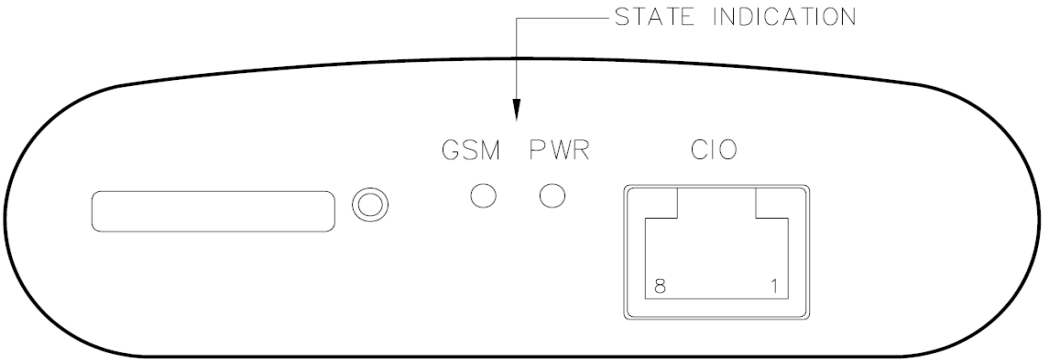
The GSM Datalogger DA4 contains voltage supply management. During idleness the module GSM Datalogger DA4 is switched to sleep mode, when energy demand is very slow (100 μA). Time of switch to sleep mode is adjustable. The status change on port or control centre can wake up GSM Datalogger DA4 to on-line mode. The sleep mode isn't possible to activate with service cable (data cable KD-2 and service jumper SEPRO).

## 2.5. Technical parameters

| GSM Datalogger DA4 | | SIEMENS MC39i |
|---|---|---|
| Complies with standards | Power safety<br>EMC<br>Radio parameters | EN 60 950:2001<br>EN 55022:1998, A1:2000, A2:2003, Cor:2003<br>3GPP TS 51.010.-1,v5.5.0<br>EN 301 511, v7.0.1 |
| Frequency bands | | EGSM900, GSM1800 and GSM1900 (GSM Phase 2/2+) |
| Transmit power | | Class 4, 2 W for EGSM900<br>Class 1, 1 W for GSM1800 |
| GPRS connection | | GPRS multi-slot class 10 (4+2)<br>GPRS mobile station class B |
| Communication speed | Transmission<br>Reception | 2 x Time slot (max. 42.8 kb/s)<br>4 x Time slot (max. 85.6 kb/s) |
| Temperature range | Function<br>Storage | -20 °C to +55 °C<br>-40 °C to +85 °C |
| IP code | On the basic code | IP20 |
| | Inside of switch box | IP43 |
| Power supply voltage | Mains power supply | +10 to +30 V DC |
| | Battery | Accumulator 12 V/51 Ah<br>Lithium battery 8 x 3,6 V/16,5 Ah<br>and other types with nominal voltage 10-30 V |
| Consumption | GPRS TX<br>GPRS on-line<br>GSM stand-by<br>Sleep mode | 3.5 W<br>1 W<br>350 mW<br>1 mW |
| Dimensions | | 30 x 90 x 102 mm<br>(moulding fixed to DIN 35 mm slat) |
| Weight | | 150 g |
| Antenna connector | | FME – 50 Ohm |
| User interfaces | PORT1<br><br>PORT2<br><br><br>CIO | RS232 – connector RJ45 (300 b/s - 115 200 b/s)<br>CNT – connector RJ45 - 2 counters, 2 binary inputs, 2 analogy inputs, 1 binary output - open collector<br>5 SW adjustable inputs (analogy, binary) / outputs (open collector) – RJ45 connector |
| Operable time | | According to numbers and type sensors, numbers of measuring, exploitation of the GPRS and according to quality of signal until 8 years out of battery change |

## 2.6. GSM Datalogger DA4 status indication

There are two LED indicators on the front panel informing on its status.

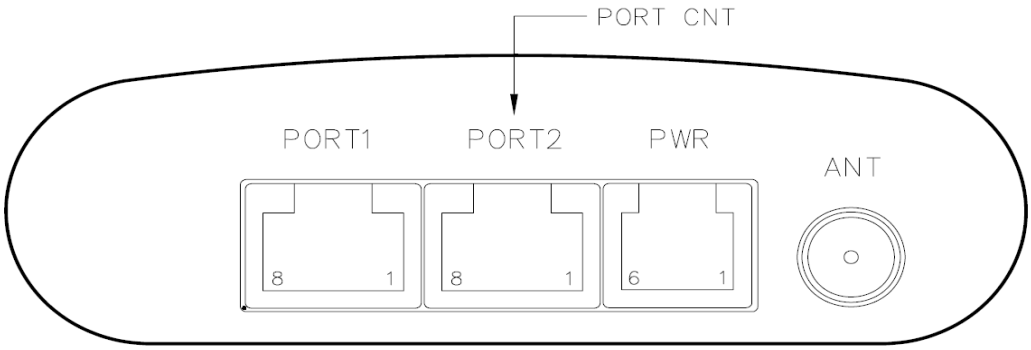



| Colour | Description | Meaning |
|---|---|---|
| GREEN | PWR | Flashes once a sec……...proper function<br>Lights permanently……....fault<br>Off……....no DC supply or sleep mode |
| RED | GPRS | Lights permanently……....neither serial established<br>Flashes rapidly…….....serial connection being established,<br>Flashes slowly……....serial connection established<br>Flashes together with PWR…..station activation failed<br>Inverse flashing to PWR……...no DNS connection<br>Off…….....GSM GPRS communication established<br>Flashes dimly……..…...GPRS transmission or reception |

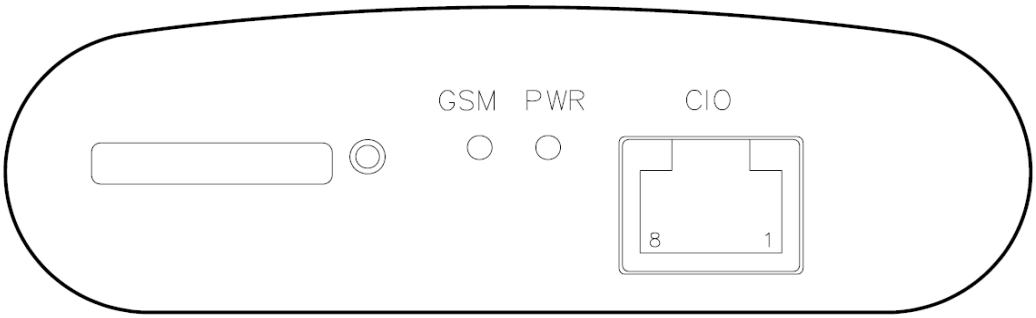
- **Serial connection** – Establishment connection in face of GSM network at the level AT commands.
- **Station activation** – Modem authentication in global DNS, reference **[1]**.
- **DNS connection** – Establishment connection with distributed database for interface address translation to IP address.
- **GPRS** – General Packet Radio Services.

## 2.7. User interfaces (connectors)

There are RJ45 (PORT1 and PORT2), RJ12 (PWR) and FME (ANT) connectors located on the back panel. The two PORT1 and PORT2 connectors are for user interfaces. The fourth PWR connector is for supply adapter connection. Antenna is connected to the last ANT connector.

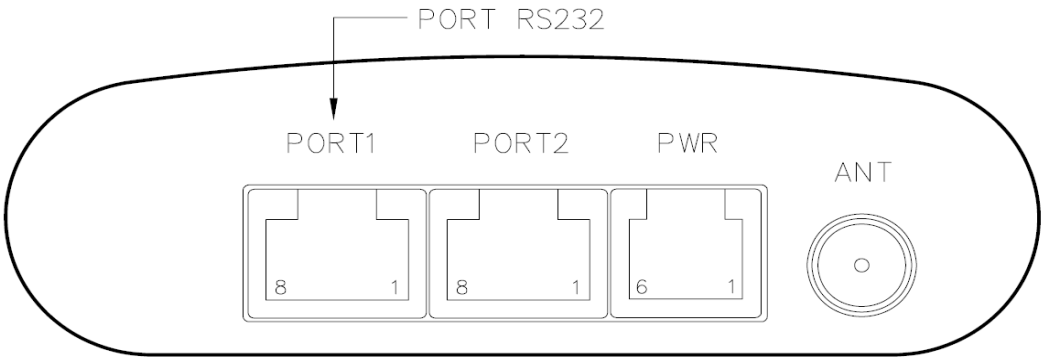



There is RJ45 (CIO) connector located on the front panel.



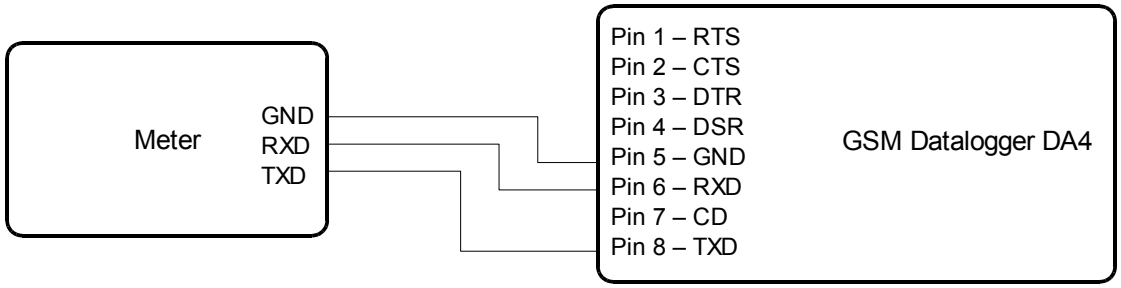
### 2.7.1. PORT1 connector - RS232

Panel socket RJ45 (RS232 – DCE - Data Communication Equipment).

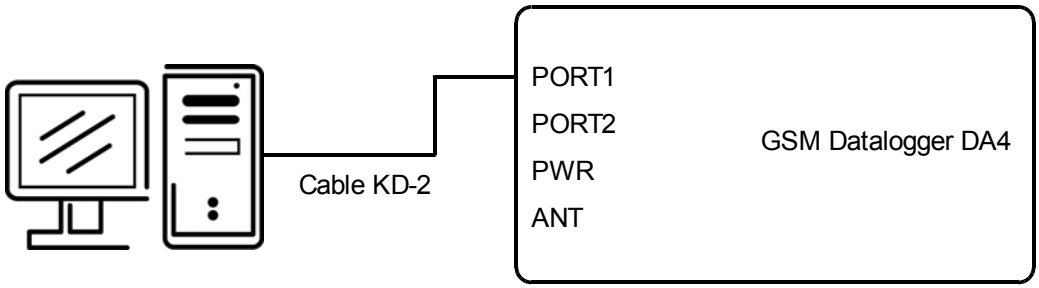



| Pin number | Signal mark | Description | Data flow direction |
|---|---|---|---|
| 1 | RTS | Request To Send | Input |
| 2 | CTS | Clear To Send | Output |
| 3 | DTR | Data Terminal Ready | Input |
| 4 | DSR | Data Set Ready – connected to +4 V through 330 Ohm | Output |
| 5 | GND | GROUND – signal ground | |
| 6 | RXD | Receive Data | Output |
| 7 | CD | Carrier Detect | Output |
| 8 | TXD | Transmit Data | Input |

Circuit example of the meter with GSM Datalogger DA4:



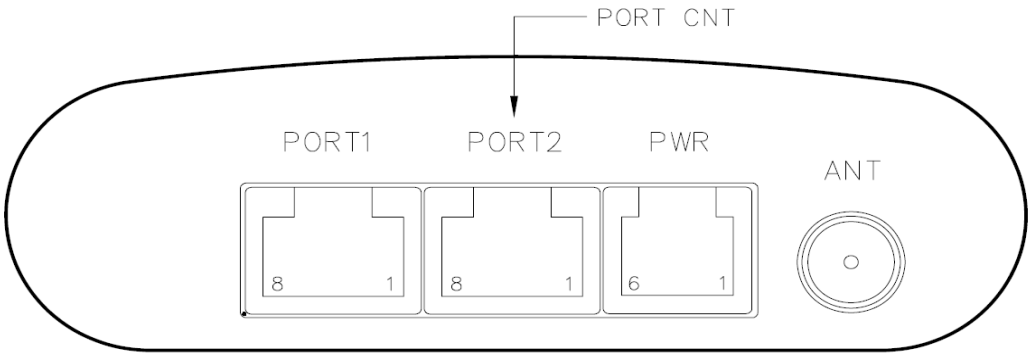
Circuit example of the PC with GSM Datalogger DA4:




- the cable KD2 is connected to the PC serial port (example. COM1)

### 2.7.2. PORT2 connector - CNT

Panel socket RJ45




| Pin number | Signal mark | Description | Direction |
|---|---|---|---|
| 1 | BIN1/CNT1 | Binary input/counter input | Input |
| 2 | BIN2/CNT2 | Binary input/counter input | Input |
| 3 | BIN3 | Binary input | Input |
| 4 | BIN4 | Binary input | Input |
| 5 | GND | Signal ground | |
| 6 | OUT1 | Binary output (open collector) | Output |
| 7 | AN1 | Analogy input | Input |
| 8 | AN2 | Analogy input | Input |

The user interface CNT is for monitoring and processing of analogy and binary signals and to control (settings) of binary signal. To disposition are 2 counter and 2 binary inputs or 4 binary inputs, 2 analogy inputs a 1 binary output. The settings of binaries and counters inputs by the help of firmware in which it is defined the singles inputs and output. The upload firmware is in RADWIN program, see reference **[3]**.

#### 2.7.2.1. Analogy input

On analogy input it detected current, converted to digital 12-bits value and modified by multiplicative and additive constant. Next the value is averaged on user settings and stored to PC memory. The basic range of input current is 0 – 20 mA at input resistance 100 Ω.

Equal of value is:

$$((12-bit.\ value+addit.constant)*multiplic.\ constant)/1000$$

The sample period on analogy inputs is adjustable in range 0 ÷ 65535 seconds. At value 0 it is sampling once per second and measurement circuit is permanent switch on. At sampling it is possible to set time of measurement circuit switch from 16 ms to 375 ms.

On the basis of signal change about bigger value then setting upper/lower limit is generated alarm. This alarm at defined settings of the GSM Datalogger DA4 generates message with values of the all active signals and send it to defined target. The alarm end is on the basis of bigger/lower signal change about set hysteresis than is upper/lower limit.

#### 2.7.2.2. Binary input

The binary input is potential-free contact which is 8 x per second sampling and sampling time is 1/64 seconds. For binary inputs is possible to set active level either log. 0 or log. 1. Choice active level can generate alarm.

#### 2.7.2.3. Counter input

The counter inputs are meters maximal to 100 Hz. The ratio impulses on input can be maximal 1:10, that means the impulse width mustn't be lower than 1/10 signal period. At lower width it isn't guaranteed the true evaluation of the metered signal. For metering of small frequencies (about mHz) it is important set the multiplicative constant which multiples metering frequency (flow) because of true evaluation.

On the basis of signal change about bigger value then setting frequency upper limit is generated alarm. Alarm is possible send after time after which upper limit must be overrun.

In case that it isn't any change on input, it is possible to define time after which the value on input will zeroes.

#### 2.7.2.4. Binary output

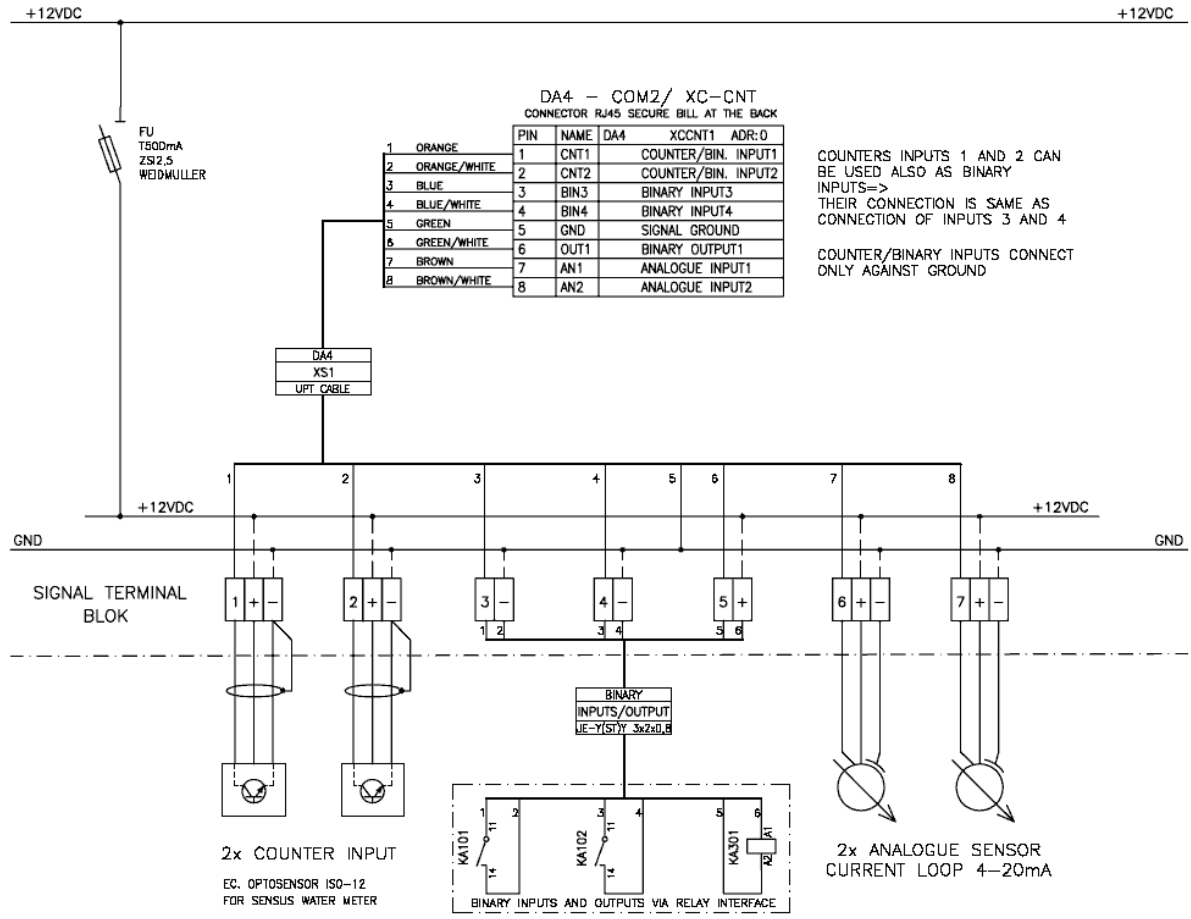
The binary output is realized by transistor with open collector. In inactive state (log 0) the transistor no transfer and is as switch off. In active state (log. 1) is transistor switch on and connect signal on ground (GND).

Maximal switching current on output is 100 mA. Maximal voltage which can be on transistor collector is power supply voltage of the GSM Datalogger DA4.

The impulse length is possible set in range 125 ÷ 8000 ms which is possible to send on output after impulses number setting (1 ÷ 65535) on input BIN1/CNT1.

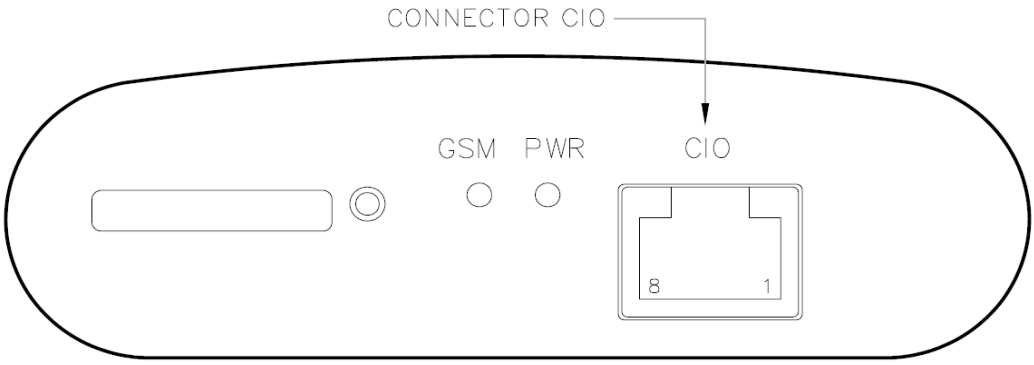
**In sleep mode the all inputs and outputs values on PORT2 are metered and controlled.**

Typical connection of DA-4 measuring circuits



### 2.7.3. PWR supply connector

Panel socket RJ45




| Pin number | Signal mark | Description | Direction |
|---|---|---|---|
| 1 | I/O 5 | Input/Output – analogue or binary input or binary output (open collector) | Input/Output |
| 2 | I/O 4 | Input/Output – analogue or binary input or binary output (open collector) | Input/Output |
| 3 | I/O 3 | Input/Output – analogue or binary input or binary output (open collector) | Input/Output |
| 4 | +12V | Output + 12V supply of other circuits (connected directly to datalogger supply) | Output |
| 5 | GND | Signal and supply ground | |
| 6 | I/O 2 | Input/Output – analogue or binary input or binary output (open collector) | Input/Output |
| 7 | I/O 1 | Input/Output – analogue or binary input or binary output (open collector) | Input/Output |
| 8 | Service | For servicing purposes only | Input/Output |

GSM Datalogger DA4 is equipped with user interface CIO for analogue signal reception and processing and control (settings) of binary signals. User is provided with 5 adjustable inputs/outputs located on CIO connector at the front panel.

There are five signals linked to CIO that are possible to process and control by setting up GSM Datalogger DA4. These signals can be controlled remotely, or their values can be sent in data form to a remote point of data network.

#### 2.7.3.1. Analogy input

Voltage is checked every 100 ms from the analogue input, transferred to digital ten-bit value and adjusted by calibration constant. The value is further average-computed according to user interface and saved in the computer memory. Basic input voltage range is 0 - 5 V.

**Beware, in sleep mode the inputs values aren't measuring!**

#### 2.7.3.2. Binary output

Binary output is implemented by a transistor with open collector connected to I/O signal. When inactive (log 0) the transistor does not conduct and acts like open switch. When active (log 1) the transistor acts like switch connecting I/O signal to the ground (GND). In both cases the I/O value is measured as an analogue input. The status of switched circuit is being checked.

Maximum switched output current is 500mA. Maximum voltage at transistor collector equals the supply voltage of GSM Datalogger DA4.

**Beware, in sleep mode the inputs values aren't measuring!**

#### 2.7.3.3. Output signal for disconnection of supply voltage

The only single-output signal is PWRSV (Power Save). The signal is linked to the supply connector (see the supply connector description). It is connected as universal I/O signal outputs. This is an open collector that switches PWRSV signal to the ground (GND). The output is controlled by a report similar to I/O outputs.

In general this output can be used to control technology.

#### 2.7.3.4. GSM Datalogger DA4 signals measuring

- **Measuring the supply voltage**

Another two signals are measured in GSM Datalogger DA4. The first is called +UN (DC SUPLY), it is an internal one and describes supply voltage on GSM Datalogger DA4 brackets. The measuring range is 0 to 30 V. The supply voltage value has an effect over GSM Datalogger DA4 function – in case it falls below the set value the GSM datalogger is disconnected, because its proper function is not safeguarded, and discharge current of reserve accumulator is reduced.

The second one is INAC (AC SUPLY) linked to the supply connector (see the supply connector description). The measuring range is 0 to 30 V. The signal is protected against overvoltage by a protection element that blocks voltage in excess of 33 V. INAC is designed for measuring of network supply voltage presence. The change of the value is recorded in GSM Datalogger DA4 statistics as a failure and rise of supply voltage 230 V.

**Beware – it is impossible to link 230 v supply voltage directly to the input!**

- **Measuring internal GSM Datalogger DA4 temperature**

To ascertain proper GSM module function, temperature is measured inside GSM Datalogger DA4. In case the temperature exceeds the set control value, the GSM module is disconnected from the supply voltage, as proper function is not guaranteed over this temperature and at the same time it is protected against heat damage.

- **Measuring DSR output signal level**

DSR signals on separate user interfaces are output signals from GSM Datalogger DA4 viewpoint. They are not controlled form the inside. Individual signals are linked through 330 Ohm resistors.

#### 2.7.3.5. I/O signals parameters

| Signal name | Measuring range [V] | Resolution [bit] | Sampling [ms] | Average from samples | Hysteresis | Control level |
|---|---|---|---|---|---|---|
| I/O1-5 | 0 to 5 | 10 | 100 | Optional 1 – 128 | Optional 0 – 255 | Optional |

#### 2.7.3.6. Settings CIO parameters

- **Activation of CIO signals**

All CIO signals have an activity feature. In case a signal is active, its value is recorded in CIO status report. Only when the active signal changes CIO may automatically generate a corresponding report. In case a signal is not set as active, no matter how big a change it will not generate change feature.

- **CIO communication parameters**

The CIO block works in any GSM Datalogger DA4 independently from user interface settings. CIO communication parameters settings decide whether the information on measured signal values will be sent to a remote user interface.

Regarding communication, the CIO block operates in two modes: passive or active. When passive, the CIO sends measured information only at the request of remote station. When active, the reports are generated on the basis of changes of measured active signals or on regular basis according to the period set.

The method of requesting CIO values is described in ARNEP protocol.

#### 2.7.3.7. Connecting CIO signals to user device

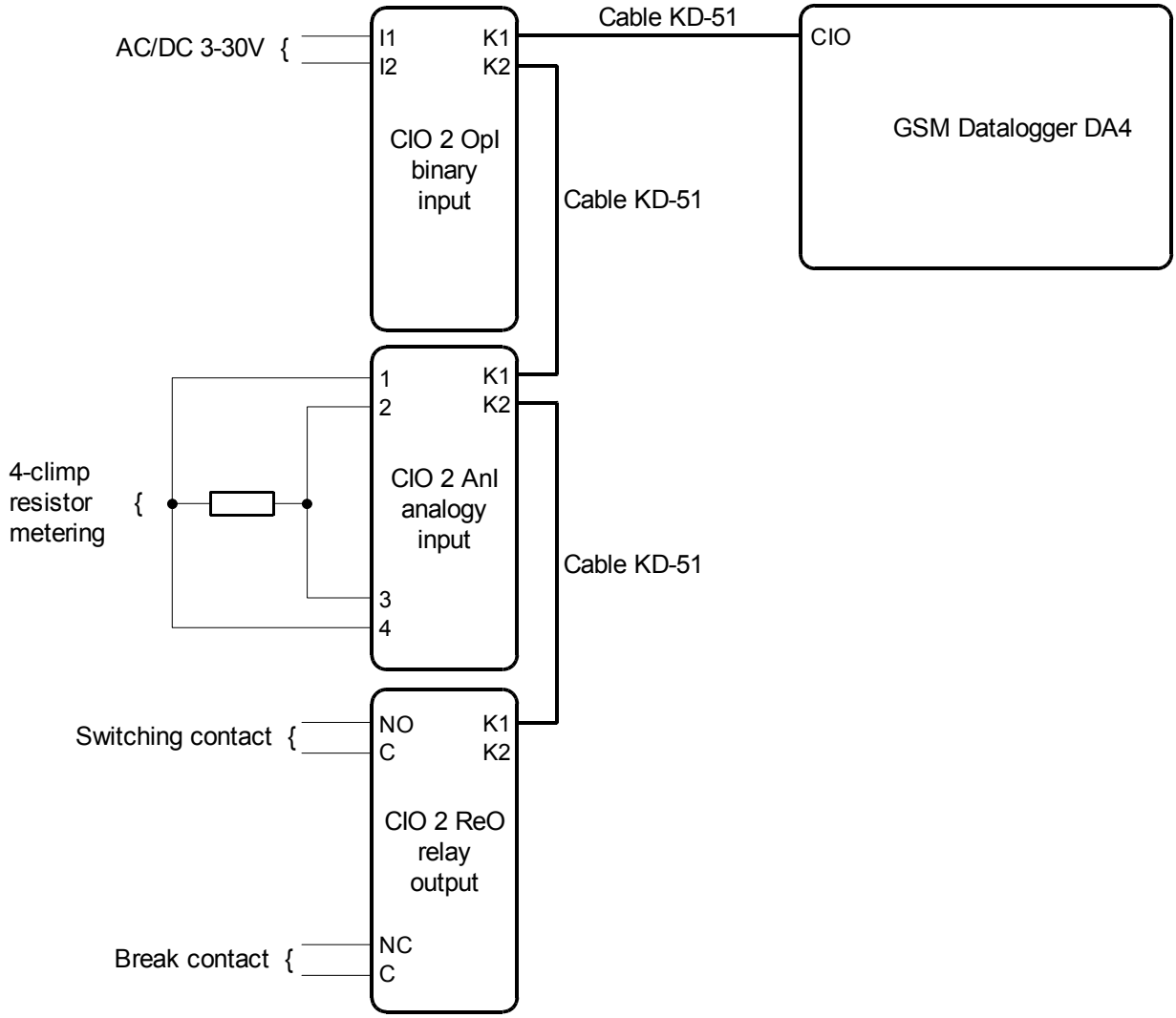
It is not appropriate and often even possible to connect I/O interface signals directly to the user device. In order to measure currents, resistance and large voltage it is necessary to mount series of circuits before I/O signals that will adjust the values measured to a voltage within 0 to 5 V range and at the same time protect the inputs from interference and overvoltage. Similarly serial electric circuits should be mounted to control power parts of the user device, as the transistor with open collector is able to switch current up to 500 mA and voltage up to the value of GSM Datalogger DA4 supply voltage.

Supplementary CIO modules are designed for practical I/O signal use, establishing an interface between the user device and I/O signals.

| Name | Type | Description |
|---|---|---|
| CIO ANI 2 | Analogue input | Analogue differential input for small voltage, current and resistance measuring It includes differential amplifier with adjustable power 1 to 10000. Exact current source 0.1 to 3 mA can be used to measure resistance. Configuration of the input signals, amplification and current source is carried out through resistance net. Presence of the input signal relevant to A/D converter working range is signalled by LED on the front panel. Input circuits are protected against short-time overvoltage by suppressors and against the long-time one by reverse fuse. |
| CIO OPI 2 | Binary input | One galvanically-separated digital input for AC/DC signals up to 30 V, on high voltage brackets up to 350 V. It includes bipolar optoelement that enables processing both input signal polarities. For AC signal it includes integration circuit that provides for direct processing of 50 Hz signal. Output logical value of the measured signal is LED signalled on the front panel. Input circuits are protected against short-time overvoltage by suppressors and against the long-time one by a reverse fuse. |
| CIO REO 2 | Binary output | One relay output. It includes a relay with one switch contact. Switch on/off contact is linked separately, common contact twice (C marking). The presence of a control signal is LED signalled. |

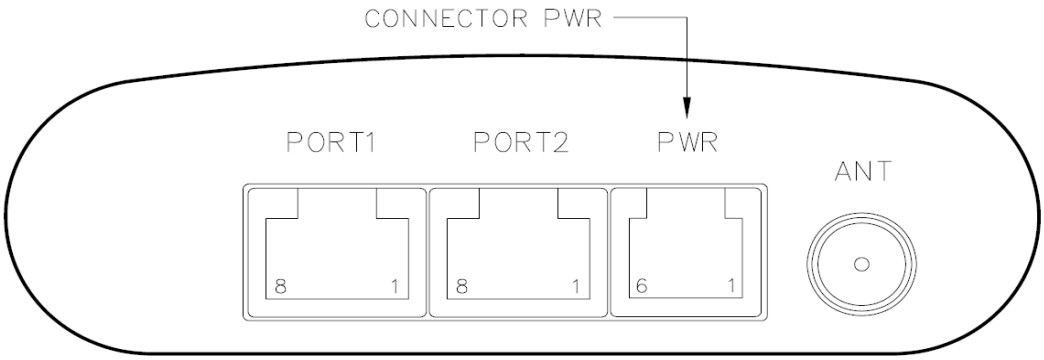
Circuit example:

The modules CIO 2 are connects by the help of KD-51 cable (cable 1:1). The connector K1 is input, K2 output to other CIO 2 module. By serial modems connection the addresses are automatically assigned. In the direction from modem the addresses raises uplink: 1,2,3,4 and 5. Maximal module number in series is five. See reference **[4]**.



### 2.7.4. PWR supply connector

Panel socket RJ12




| Pin number | Signal mark | Description | Direction |
|---|---|---|---|
| 1 | +UN | Positive pole of DC supply voltage (10 to 30 V) | |
| 2 | PWRSV | Output open collector (Power Save) See CIO description | Output |
| 3 | INAC | Network supply presence check. Range 0 – V | Input |
| 4 | +UN | Positive pole of DC supply voltage (10 to 30 V) | |
| 5 | GND | Negative pole of DC supply voltage | |
| 6 | GND | Negative pole of DC supply voltage | |

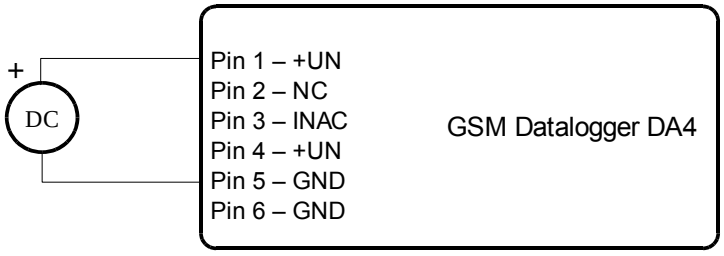
Note: Clamps 1-4 (+UN) and 5-6 (GND) are in the datalogger connect for bigger current overload.

On the power supply connector it is possible to use the signal INAC (NAP230) for present AC voltage monitoring for power supply (it can be functional only in case of supply accumulator backup).

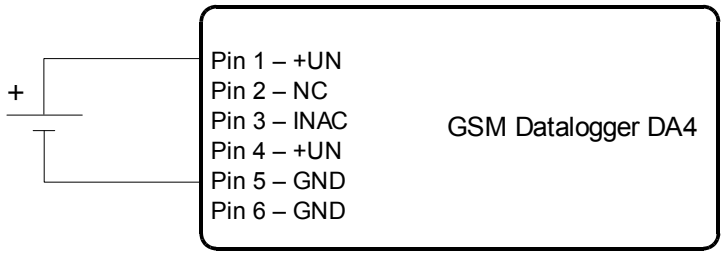
**Beware, on INAC (NAP230) input it isn't possible connect link voltage 230 V direct !**

Circuit example:

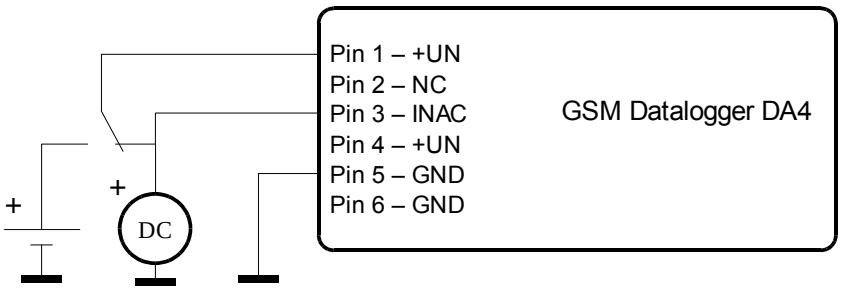
**DC supply**



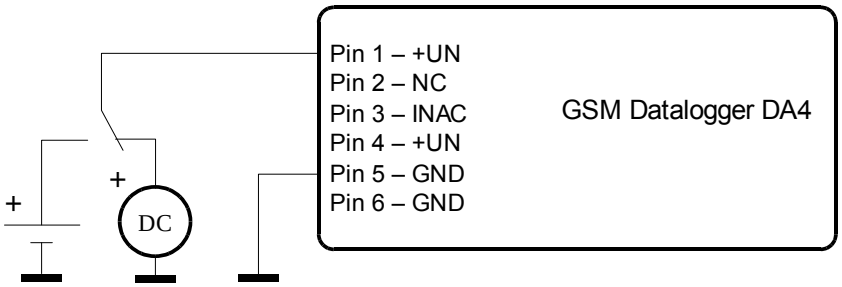
**Battery supply**




**DC supply with backup battery with present supply monitoring**

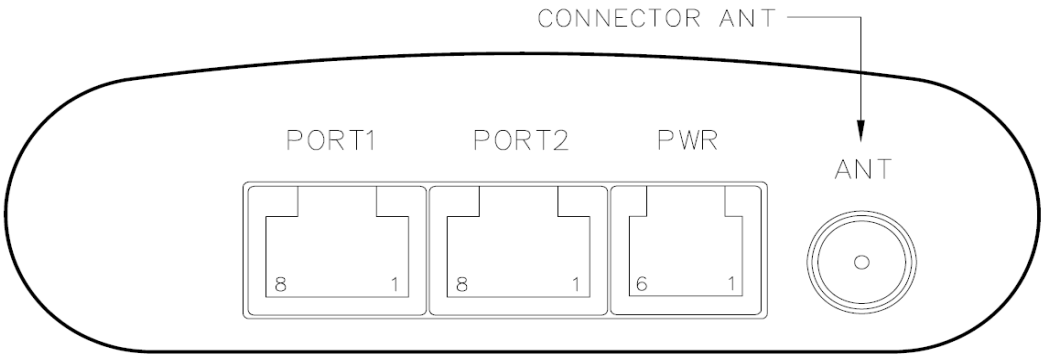



**DC supply with backup battery without present supply monitoring**



### 2.7.5. Antenna connection

Antenna is connected to GSM Datalogger DA4 by FME connector on the back panel.



## 2.8. Technical specifications of port 2

- ***PORT1 with RS232 serial link***

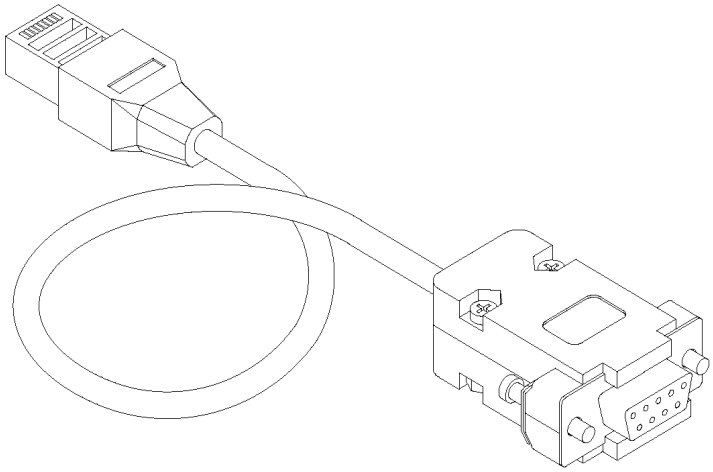
| Name of product | Expansion port RS232 | |
|---|---|---|
| Power supply | Internal | ... |
| Environment | Operating temperature | -20 .. +55 C |
| | Storage temperature | -20 .. +85 C |
| Standards | Emission | EN 55022/B |
| | Immunity | ETS 300 342 |
| | Safety | EN 60950 |
| Bus RS232 (EN 1434) | Max. operating bus current | 15 mA |
| | Max. data rate | 230400 bps |
| | Max. overvoltage | ±30 V |
| | Max. total cable length (300Bd, 200nF/km) | 20 m |

- ***PORT2 with direct connected CNT users signals***

| Name of product | Expansion port CNT | |
|---|---|---|
| Power supply | Voltage | Internal 10 .. 30V |
| Supply power | Sleep | 100 µA (counter is functional) |
| | Operation | 2 mA |
| Environment | Operating temperature | -20 .. +55 C |
| | Storage temperature | -20 .. +85 C |
| Standards | Emission | EN 55022/B |
| | Immunity | ETS 300 342 |
| | Safety | EN 60950 |
| | Isolation | EN 60747 |
| Inputs/outputs | 2x counter | Max. 100 Hz, ratio max. 1:10 |
| | 2x analogy inputs | 0 .. 20 mA, $R_{in}$ 100 Ohms |
| | 2x binary inputs | reed contact |
| | 1x output (open collector) | 100 mA |
| Others | Voltage resistance | Permanent |
| | Sleeping mode | Controlled |

## 2.9. GSM Datalogger DA4 settings

Configuration and service SW RADWIN is designed for the datalogger setup (reference **[3]**). The software is created for MS WINDOWS 95/98/ME/2000/XP platforms. Service cable is designed for GSM Datalogger DA4 connection. After service cable (data cable KD-2 and jump service SEPRO) is connected to any serial user interface RS232 and service SW runs on a connected PC it is possible to execute not just all the needed GSM Datalogger DA4 settings, but service interventions in the data network as well.

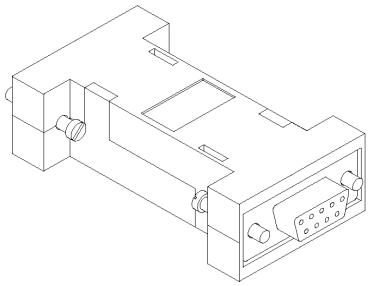


Data cable KD-2

GSM Datalogger DA4 settings can be done remotely via GPRS. Remote configuration access is protected by password. The enter password it is possible only after straight connect by service cable.

## 2.10. Service cable

GSM Datalogger DA4 – PC connection cable with DCR and GND signals connected at 100 Ohm. It is made from normal data cable KD-2 by adding service interconnection SEPRO. It is necessary to interconnect all eight signals between GSM Datalogger DA4 and PC. See RJ45 connectors' description in chapter **2.7.1**.



Service interconnection SEPRO to the data cable

## 2.11. XC-CNT protocol

To enable datalogger functionality must be selected protocol XC-CNT on interface PORT 2. This protocol is used to read internal datalogger buffer of expander board XC-CNT. Data is archived to backuped modem RAM, sending by one of implemented protocols and control of main power supply in power management mode.

## 2.12. Available communication protocols

Using XC-CNT protocol parameter „RF channel protocol“ can be choosed a number of communication protocols. List of protocols:

**RDS92**

- data sending by message code 0x30
- remote XC-CNT configuration
- remote XC-CNT counters settings
- digital output remote control
- data logger reading, when power management is not active
- maximum message length 2048 B (1000 B for GPRS)

**MODBUS RTU master**

- data sending by message code 0x10 (write registers)
- maximum message length 255 B

**MODBUS RTU slave**

- data logger reading by message code 0x03 (read registers)
- maximum message length 255 B

**IEC 60870-5-104**

- data sending by telegrams type M_SP_TB_1, M_ME_TF_1 and M_IT_TB_1
- telegrams processing type C_IC_NA_1 and C_CS_NA_1
- outputs control by telegrams C_SC_NA_1 or C_SC_TA_1
- data encapsuling into TCP or ARNEP

**MyIO**

- data sending by HTTP protocol
- remote XC-CNT configuration
- digital output remote control

**SMS**

- data sending by SMS
- maximum message length 160 characters

## 2.13. Recommended settings for testing

| Parameter | Settings |
|---|---|
| Sleep mode | NO |
| Samples period storing | 1 min |
| Wake-up period | 0 min |
| Period between communications | 1 min |
| ANx – sample period | 0 sec |

## 2.14. XC-CNT/RDS92 protocol description

The DA4 automatically sends all logs to dispatching by message with 0x30 code after defined time (the DA4 logs request about storage). The dispatching confirms every logging by message with 0x31 code (answer on request about the DA4 logs storage) in which it can specify time, after which the DA4 will stay in receive yet. In case of need the dispatching have possibility to send message with 0x06 code (data request) or 0x08 code (data logging request) for snapping or the DA4 parameters set up.

### Request about the DA4 logs storage

| 1 | 1 | 2 | 1 | 1 | 1 |
|---|---|---|---|---|---|
| Type | Address | Length | Code | PIN | RecLen |

| 2 | 4 | 2 | 2 | 2 | 2 |
|---|---|---|---|---|---|
| ID | Time | Alarms | DCVoltage | BIN | AN1 |

| 2 | 4 | 2 | 2 | 2 | 2 |
|---|---|---|---|---|---|
| AN2 | CNT1 | CNT1FAct | CNT1FAvg | CNT1FMin | CNT1FMax |

| 4 | 2 | 2 | 2 | 2 | 2 |
|---|---|---|---|---|---|
| CNT2 | CNT2FAct | CNT2FAvg | CNT2FMin | CNT2FMax | ACVoltage |

| 2 | 2 | 2 | 2 | 2 | 2 |
|---|---|---|---|---|---|
| Temperature | CIO1 | CIO2 | CIO3 | CIO4 | CIO5 |

| 8 to 54 | 8 to 54 | ... | 1 |
|---|---|---|---|
| 2. log | 3. log | ... | Sum |

*Type* – RDS92 message type (1 byte). 0x44 always.
*Address* – station interface address (1 byte).
*Length* – RDS92 message data part length (2 bytes, lower first).
*Code* – request code about the DA4 logs storage (1 byte). 0x30 always.
*PIN* – packet identification number (1 byte).
*RecLen* – one log length (1 byte).

- 8 bytes – every log contents ID to Alarms array
- 16 bytes – every log contents ID to AN2 array
- 28 bytes – every log contents ID to CNT1FMax array
- 40 bytes – every log contents ID to CNT2FMax array
- 54 bytes – every log contents ID to CIO5 array

*ID* – log number (2 bytes, higher first).
*Time* – time stamp – seconds number from 1.1.1970 (4 bytes, higher first).
*Alarms* – alarms actual state bits array (2 bytes, higher first).

- *bit 0* – active level on input BIN1
- *bit 1* – active level on input BIN2
- *bit 2* – active level on input BIN3
- *bit 3* – active level on input BIN4
- *bit 4* – analogy input upper limit overrun AN1
- *bit 5* – analogy input lower limit overrun AN1
- *bit 6* – analogy input upper limit overrun AN2
- *bit 7* – analogy input lower limit overrun AN2
- *bit 8* – limit frequency overrun CNT1
- *bit 9* – limit frequency overrun CNT2
- *bit 10* – active level on input CIO1
- *bit 11* – active level on input CIO2
- *bit 12* – active level on input CIO3
- *bit 13* – active level on input CIO4
- *bit 14* – active level on input CIO5
- *bit 15* – power supply failure

*DCVoltage* – power supply in tens mV (2 bytes, higher first).
*BIN* – binary inputs states (2 bytes, higher first).

- *bit 0* – level on input BIN1
- *bit 1* – level on input BIN2
- *bit 2* – level on input BIN3
- *bit 3* – level on input BIN4
- *bit 6* – level on output BOUT1
- *bit 10* – level on input CIO1
- *bit 11* – level on input CIO2
- *bit 12* – level on input CIO3
- *bit 13* – level on input CIO4
- *bit 14* – level on input CIO5
- *bit 15* – value validity CIO (DCVoltage, ACVoltage, Temperature and CIO1 to CIO5)

*AN1* – analogy input value AN1 (2 bytes, higher first, with marker).
*AN2* – analogy input value AN2 (2 bytes, higher first, with marker).
*CNT1* – counter status CNT1 (4 bytes, higher first).
*CNT1FAct* – counter actual frequency CNT1 (2 bytes, higher first).
*CNT1FAvg* – counter average frequency CNT1 (2 bytes, higher first).
*CNT1FMin* – counter minimal frequency CNT1 (2 bytes, higher first).
*CNT1FMax* – counter maximal frequency CNT1 (2 bytes, higher first).
*CNT2* – counter status CNT2 (4 bytes, higher first).
*CNT2FAct* – counter actual frequency CNT2 (2 bytes, higher first).
*CNT2FAvg* – counter average frequency CNT2 (2 bytes, higher first).
*CNT2FMin* – counter minimal frequency CNT2 (2 bytes, higher first).
*CNT2FMax* – counter maximal frequency CNT2 (2 bytes, higher first).
*ACVoltage* – line voltage in tens mV (2 bytes, higher first).
*Temperature* – station temperature in decimals °C (2 bytes, higher first, with marker).
*CIO1* – analogy input value CIO1 (2 bytes, higher first).
*CIO2* – analogy input value CIO2 (2 bytes, higher first).
*CIO3* – analogy input value CIO3 (2 bytes, higher first).
*CIO4* – analogy input value CIO4 (2 bytes, higher first).
*CIO5* – analogy input value CIO5 (2 bytes, higher first).
*Sum* – RDS92 message check sum (1 byte).

### *Answer on request about the DA4 logs storage*

| 1 | 1 | 2 | 1 | 1 | 1 |
|---|---|---|---|---|---|
| Type | Address | Length | Code | PIN | Time |

| 1 |
|---|
| Sum |

*Type* – RDS92 message type (1 byte). 0x44 always.
*Address* – interface station address (1 byte).
*Length* – RDS92 message data part length (2 bytes, lower first). 0x03 always.
*Code* – confirmation code of the DA4 logs storage (1 byte). 0x31 always.
*PIN* – confirmations packet identification number (1 byte).
*Time* – seconds number after which the DA4 will stay in receive after confirmation receiving (1 byte).
*Sum* – RDS92 message check sum (1 byte).

### *Data request*

| 1 | 1 | 2 | 1 | 2 | 2 |
|---|---|---|---|---|---|
| Type | Address | Length | Code | BlockCount | BlockAdr1 |

| 2 | ... | 2 | 2 | ... | 1 |
|---|---|---|---|---|---|
| BlockLen1 | ... | BlockAdrX | BlockLenX | ... | Sum |

*Type* – RDS92 message type (1 byte). 0x44 always.
*Address* – interface station address (1 byte).
*Length* – RDS92 message data part length (2 bytes, lower first).
*Code* – data request code (1 byte). 0x06 always.
*BlockCount* – block number (2 bytes, higher first).
*BlockAdr1* – first block start address (2 bytes, higher first).
*BlockLen1* – first block length (2 bytes, higher first).
*BlockAdrX* – X-th block start address (2 bytes, higher first).
*BlockLenX* – X-th block length (2 bytes, higher first).
*Sum* – RDS92 message check sum (1 byte).

### *Answer on data request*

| 1 | 1 | 2 | 1 | 2 | 2 |
|---|---|---|---|---|---|
| Type | Address | Length | Code | BlockCount | BlockAdr1 |

| 2 | N | ... | 2 | 2 | N |
|---|---|---|---|---|---|
| BlockLen1 | Data1 | ... | BlockAdrX | BlockLenX | DataX |

| ... | 1 |
|---|---|
| ... | Sum |

*Type* – RDS92 message type (1 byte). 0x44 always.
*Address* – interface station address (1 byte).
*Length* – RDS92 message data part length (2 bytes, lower first).
*Code* – Data request answer code (1 byte). 0x07 always.
*BlockCount* – block number (2 bytes, higher first).
*BlockAdr1* – first block start address (2 bytes, higher first).
*BlockLen1* – first block length (2 bytes, higher first).
*Data1* – first block data (N bytes).
*BlockAdrX* – X-th block start address (2 bytes, higher first).
*BlockLenX* – X-th block length (2 bytes, higher first).
*DataX* – X-th block length (N bytes).
*Sum* – RDS92 message check sum (1 byte).

## *Data loggin reguest*

| 1 | 1 | 2 | 1 | 2 | 2 |
|---|---|---|---|---|---|
| Type | Address | Length | Code | BlockCount | BlockAdr1 |

| 2 | N | ... | 2 | 2 | N |
|---|---|---|---|---|---|
| BlockLen1 | Data1 | ... | BlockAdrX | BlockLenX | DataX |

| ... | 1 |
|---|---|
| ... | Sum |

*Type* – RDS92 message type (1 byte). 0x44 always.
*Address* – interface station address (1 byte).
*Length* – RDS92 message data part length (2 bytes, lower first).
*Code* – request code about data loggin (1 byte). 0x08 always.
*BlockCount* – block number (2 bytes, higher first).
*BlockAdr1* – first block start address (2 bytes, higher first).
*BlockLen1* – first block length (2 bytes, higher first).
*Data1* – first block data (N bytes).
*BlockAdrX* – X-th block start address (2 bytes, higher first).
*BlockLenX* – X-th block length (2 bytes, higher first).
*DataX* – X-th block length (N bytes).
*Sum* – RDS92 message check sum (1 byte).

## *Answer on data loggin reguest*

| 1 | 1 | 2 | 1 | 2 | 2 |
|---|---|---|---|---|---|
| Type | Address | Length | Code | BlockCount | BlockAdr1 |

| 2 | N | ... | 2 | 2 | N |
|---|---|---|---|---|---|
| BlockLen1 | Data1 | ... | BlockAdrX | BlockLenX | DataX |

| ... | 1 |
|---|---|
| ... | Sum |

*Type* – RDS92 message type (1 byte). 0x44 always.
*Address* – interface station address (1 byte).
*Length* – RDS92 message data part length (2 bytes, lower first).

*Code* – request code about data loggin (1 byte). 0x09 always.
*BlockCount* – block number (2 bytes, higher first).
*BlockAdr1* – first block start address (2 bytes, higher first).
*BlockLen1* – first block length (2 bytes, higher first).
*Data1* – first block data (N bytes).
*BlockAdrX* – X-th block start address (2 bytes, higher first).
*BlockLenX* – X-th block length (2 bytes, higher first).
*DataX* – X-th block length (N bytes).
*Sum* – RDS92 message check sum (1 byte).

## *The DA4 addresses space*

| Address | Length | Access | Description |
|---|---|---|---|
| 0x0200 | 1 | -/W | binary output control |
| 0x0500 | 4 | -/W | counter status set up CNT1 |
| 0x0600 | 4 | -/W | counter status set up CNT2 |
| 0x1000 | 4 | R/- | actual log – ID |
| 0x1004 | 4 | R/- | actual log – Time |
| 0x1008 | 2 | R/- | actual log – Alarms |
| 0x100A | 2 | R/- | actual log – DCVoltage * |
| 0x100C | 2 | R/- | actual log – BIN * |
| 0x100E | 2 | R/- | actual log – AN1 |
| 0x1010 | 2 | R/- | actual log – AN2 |
| 0x1012 | 4 | R/- | actual log – CNT1 |
| 0x1016 | 2 | R/- | actual log – CNT1Freq |
| 0x1018 | 2 | R/- | actual log – CNT1FreqAvg |
| 0x101A | 2 | R/- | actual log – CNT1FreqMin |
| 0x101C | 2 | R/- | actual log – CNT1FreqMax |
| 0x101E | 4 | R/- | actual log – CNT2 |
| 0x1022 | 2 | R/- | actual log – CNT2Freq |
| 0x1024 | 2 | R/- | actual log – CNT2FreqAvg |
| 0x1026 | 2 | R/- | actual log – CNT2FreqMin |
| 0x1028 | 2 | R/- | actual log – CNT2FreqMax |
| 0x102A | 2 | R/- | actual log – ACVoltage * |
| 0x102C | 2 | R/- | actual log – Temperature * |
| 0x102E | 2 | R/- | actual log – CIO1 * |
| 0x1030 | 2 | R/- | actual log – CIO2 * |

| Address | Length | Access | Description |
|---|---|---|---|
| 0x1032 | 2 | R/- | actual log – CIO3 * |
| 0x1034 | 2 | R/- | actual log – CIO4 * |
| 0x1036 | 2 | R/- | actual log – CIO5 * |
| 0x1038 | 8 | R/- | actual log – reservation |
| 0x1040 | 64 | R/- | 2. log |
| 0x1080 | 64 | R/- | 3. log |
| ... | ... | ... | ... |
| 0xEFC0 | 64 | R/- | 896. log |
| 0xF000 | 1 | R/W | sign bits array<br>bit 0 – sleep mode<br>bit 1 – send all values CIO<br>bit 2 – send SMS behind communication failure<br>bit 3 – send alarms status only<br>bit 4 – send alarm end at once |
| 0xF001 | 2 | R/W | sample storage period [min] |
| 0xF003 | 2 | R/W | wake up period [min] |
| 0xF005 | 2 | R/W | period between communications [min] |
| 0xF007 | 2 | R/W | permit alarms<br>• bit 0 – active level on input BIN1<br>• bit 1 – active level on input BIN2<br>• bit 2 – active level on input BIN3<br>• bit 3 – active level on input BIN4<br>• bit 4 – analogy input upper limit overrun AN1<br>• bit 5 – analogy input lower limit overrun AN1<br>• bit 6 – analogy input upper limit overrun AN2<br>• bit 7 – analogy input lower limit overrun AN2<br>• bit 8 – limit frequency overrun CNT1<br>• bit 9 – limit frequency overrun CNT2<br>• bit 10 – active level on input CIO1<br>• bit 11 – active level on input CIO2<br>• bit 12 – active level on input CIO3<br>• bit 13 – active level on input CIO4<br>• bit 14 – active level on input CIO5<br>• bit 15 – power supply failure |
| 0xF009 | 1 | R/W | binary inputs negative logical<br>• bit 0 – input BIN1 |

| Address | Length | Access | Description |
|---|---|---|---|
| | | | • bit 1 – input BIN2<br>• bit 2 – input BIN3<br>• bit 3 – input BIN4 |
| 0xF00A | 2 | R/W | AN1 - sampling period [sec] |
| 0xF00C | 2 | R/W | AN1 - multiplicative constant (with marker) |
| 0xF00E | 2 | R/W | AN1 - aditive constant (with marker) |
| 0xF010 | 2 | R/W | AN1 - hysteresis value (with marker) |
| 0xF012 | 2 | R/W | AN1 - lower limit (with marker) |
| 0xF014 | 2 | R/W | AN1 - upper limit (with marker) |
| 0xF016 | 2 | R/W | AN2 - sampling period [sec] |
| 0xF018 | 2 | R/W | AN2 - multiplicative constant (with marker) |
| 0xF01A | 2 | R/W | AN2 - aditive constant (with marker) |
| 0xF01C | 2 | R/W | AN2 - hysteresis value (with marker) |
| 0xF01E | 2 | R/W | AN2 - lower limit (with marker) |
| 0xF020 | 2 | R/W | AN2 - upper limit (with marker) |
| 0xF022 | 2 | R/W | CNT1 - multiplicative constant |
| 0xF024 | 2 | R/W | CNT1 - upper limit |
| 0xF026 | 2 | R/W | CNT1 - limit overrun time [sec] |
| 0xF028 | 1 | R/W | CNT1 - time for measuring reset [sec] |
| 0xF029 | 2 | R/W | CNT2 - multiplicative constant |
| 0xF02B | 2 | R/W | CNT2 - upper limit |
| 0xF02D | 2 | R/W | CNT2 - limit overrun time [sec] |
| 0xF02F | 1 | R/W | CNT2 - time for measuring reset [sec] |
| 0xF030 | 1 | R/W | bits 7-3:<br>AN1 - measuring circuit switch time on<br>• 0 → 1/64 sec<br>• 1 → 2/64 sec<br>• ...<br>• 30 → 31/64 sec<br>bits 2-0:<br>AN1 - samples number for averaging<br>• 0 → 1 sample<br>• 1 → 2 samples<br>• 2 → 4 samples |

| Address | Length | Access | Description |
|---|---|---|---|
| | | | • 4 → 8 samples<br>• 5 → 16 samples |
| 0xF031 | 1 | R/W | bits 7-3:<br>AN2 - measuring circuit switch time on<br>• 0 → 1/64 sec<br>• 1 → 2/64 sec<br>• ...<br>• 30 → 31/64 sec<br>bits 2-0:<br>AN2 - samples number for averaging<br>• 0 → 1 sample<br>• 1 → 2 samples<br>• 2 → 4 samples<br>• 4 → 8 samples<br>• 5 → 16 samples |
| 0xF032 | 1 | R/W | communication repeat period [min] |
| 0xF033 | 1 | R/W | data sending attempts number |
| 0xF034 | 1 | R/W | active mode time [min] |
| 0xF035 | 1 | R/W | quiescent level of binary outputs<br>• bit 0 – output OUT1 |
| 0xF036 | 2 | R/W | dispenser – impulse number on input BIN1/CNT1 |
| 0xF038 | 1 | R/W | dispenser – impulse lenght on output OUT1 [1/8 sec] |
| | | | |
| 0xFF00 | 2 | -/W | time on which the DA4 will stay on receiving yet |

* CIO value validity is indicates by BIN array 15th bit.

## 2.15. XC-CNT/MODBUS RTU master protocol description

The DA4 automatically sends all logs to dispatching by message 0x10 code (entry values to more registers) after defined time and awaits appropriate confirmation from dispatching.

### DA4 logs storage request

| 1 | 1 | 2 | 2 | 1 | 2 |
|---|---|---|---|---|---|
| Address | FC | RN | RC | BC | RecLen |

| 2 | 4 | 2 | 2 | 2 | 2 |
|---|---|---|---|---|---|
| ID | Time | Alarms | DCVoltage | BIN | AN1 |

| 2 | 4 | 2 | 2 | 2 | 2 |
|---|---|---|---|---|---|
| AN2 | CNT1 | CNT1FAct | CNT1FAvg | CNT1FMin | CNT1FMax |

| 4 | 2 | 2 | 2 | 2 | 2 |
|---|---|---|---|---|---|
| CNT2 | CNT2FAct | CNT2FAvg | CNT2FMin | CNT2FMax | ACVoltage |

| 2 | 2 | 2 | 2 | 2 | 40 |
|---|---|---|---|---|---|
| Temperature | CIO1 | CIO2 | CIO3 | CIO4 | CIO5 |

| 2 |
|---|
| CRC |

*Address* – dispatching address (1 byte)
*FC* – function code (2 bytes, higher first). 0x10 always.
*RN* – referential number (2 bytes, higher first). It specifies the data space start in which the data are written. Every master have dedicated space of the 256 registers where the first space register has number equal 256-multiple of the master address.
*RC* – registers number (2 bytes, higher first).
*BC* – bytes number (1 bytes).
*RecLen* – log length (1 byte).

- 8 bytes – every log contents ID to Alarms array
- 16 bytes – every log contents ID to AN2 array
- 28 bytes – every log contents ID to CNT1FMax array
- 40 bytes – every log contents ID to CNT2FMax array
- 54 bytes – every log contents ID to CIO5 array

*ID* – log number (2 bytes, higher first).
*Time* – time stamp – seconds number from 1.1.1970 (4 bytes, higher first).
*Alarms* – alarms actual state bits array (2 bytes, higher first).

- *bit 0* – active level on input BIN1
- *bit 1* – active level on input BIN2
- *bit 2* – active level on input BIN3
- *bit 3* – active level on input BIN4
- *bit 4* – analogy input upper limit overrun AN1
- *bit 5* – analogy input lower limit overrun AN1
- *bit 6* – analogy input upper limit overrun AN2
- *bit 7* – analogy input lower limit overrun AN3
- *bit 8* – limit frequency overrun CNT1
- *bit 9* – limit frequency overrun CNT2
- *bit 10* – active level on input CIO1
- *bit 11* – active level on input CIO2
- *bit 12* – active level on input CIO3
- *bit 13* – active level on input CIO4
- *bit 14* – active level on input CIO5
- *bit 15* – power supply failure

*DCVoltage* – power supply in tens mV (2 bytes, higher first).
*BIN* – binary inputs states (2 bytes, higher first).

- *bit 0* – level on input BIN1
- *bit 1* – level on input BIN2
- *bit 2* – level on input BIN3
- *bit 3* – level on input BIN4
- bit 6 – level on output BOUT1
- *bit 10* – level on input CIO1

- *bit 11* – level on input CIO2
- *bit 12* – level on input CIO3
- *bit 13* – level on input CIO4
- *bit 14* – level on input CIO5
- *bit 15* – value validity CIO (DCVoltage, ACVoltage, Temperature a CIO1 to CIO5)

*AN1* – analogy input value AN1 (2 bytes, higher first, with marker).
*AN2* – analogy input value AN2 (2 bytes, higher first, with marker).
*CNT1* – counter status CNT1 (4 bytes, higher first).
*CNT1FAct* – counter actual frequency CNT1 (2 bytes, higher first).
*CNT1FAvg* – counter average frequency CNT1 (2 bytes, higher first).
*CNT1FMin* – counter minimal frequency CNT1 (2 bytes, higher first).
*CNT1FMax* – counter maximal frequency CNT1 (2 bytes, higher first).
*CNT2* – counter status CNT2 (4 bytes, higher first).
*CNT2FAct* – counter actual frequency CNT2 (2 bytes, higher first).
*CNT2FAvg* – counter average frequency CNT2 (2 bytes, higher first).
*CNT2FMin* – counter minimal frequency CNT2 (2 bytes, higher first).
*CNT2FMax* – counter maximal frequency CNT2 (2 bytes, higher first).
*ACVoltage* – line voltage in tens mV (2 bytes, higher first).
*Temperature* – station temperature in decimals ºC (2 bytes, higher first, with marker).
*CIO1* – analogy input value CIO1 (2 bytes, higher first).
*CIO2* – analogy input value CIO2 (2 bytes, higher first).
*CIO3* – analogy input value CIO3 (2 bytes, higher first).
*CIO4* – analogy input value CIO4 (2 bytes, higher first).
*CIO5* – analogy input value CIO5 (2 bytes, higher first).
*CRC* – 16-bit check sum of data packet (2 bytes).

### *Answer on request about the DA4 logs storage*

| 1 | 1 | 2 | 2 | 2 |
|---|---|---|---|---|
| Address | FC | RN | RC | CRC |

*Address* – dispatching address (1 byte)
*FC* – function code (2 bytes, higher first). 0X10 always.
*RN* – referential number (2 bytes, higher first).
*RC* – registers number (2 bytes, higher first).
*CRC* – 16-bit check sum of data packet (2 bytes).

## *2.16. XC-CNT/MODBUS RTU slave protocol description*

The DA4 automatically stores the measuring data to its operation memory which the dispatching can reads by message with 0x03 code (reads of more registers values).

### *The DA4 addresses space*

| Address | Access | Description |
|---|---|---|
| 0x1000 | R/- | actual log – upper 16 bits of the log number |
| 0x1001 | R/- | actual log – lower 16 bits of the log number |
| 0x1002 | R/- | actual log – upper 16 bits of the time stamp |
| 0x1003 | R/- | actual log – lower 16 bits of the time stamp |
| 0x1004 | R/- | actual log – alarms status<br>• bit 0 – active level on input BIN1<br>• bit 1 – active level on input BIN2<br>• bit 2 – active level on input BIN3<br>• bit 3 – active level on input BIN4<br>• bit 4 – analogy input upper limit overrun AN1<br>• bit 5 – analogy input lower limit overrun AN1 |

| Address | Access | Description |
|---|---|---|
| | | • bit 6 – analogy input upper limit overrun AN2<br>• bit 7 – analogy input lower limit overrun AN2<br>• bit 8 – limit frequency overrun CNT1<br>• bit 9 – limit frequency overrun CNT2<br>• bit 10 – active level on input CIO1<br>• bit 11 – active level on input CIO2<br>• bit 12 – active level on input CIO3<br>• bit 13 – active level on input CIO4<br>• bit 14 – active level on input CIO5<br>• bit 15 – power supply failure |
| 0x1005 | R/- | actual log – power supply in tens mV * |
| 0x1006 | R/- | actual log – binary inputs states<br>• bit 0 – input BIN1<br>• bit 1 – input BIN2<br>• bit 2 – input BIN3<br>• bit 3 – input BIN4<br>• bit 6 – level on output BOUT1<br>• bit 10 – level on input CIO1 *<br>• bit 11 – level on input CIO2 *<br>• bit 12 – level on input CIO3 *<br>• bit 13 – level on input CIO4 *<br>• bit 14 – level on input CIO5 *<br>• bit 15 – validity of CIO value |
| 0x1007 | R/- | actual log – precalculate value AN1 (with marker) |
| 0x1008 | R/- | actual log – precalculate value AN2 (with marker) |
| 0x1009 | R/- | actual log – upper 16 bits CNT1 |
| 0x100A | R/- | actual log – lower 16 bits |
| 0x100B | R/- | actual log – actual frequency CNT1 |
| 0x100C | R/- | actual log – average frequency CNT1 |
| 0x100D | R/- | actual log – minimal frequency CNT1 |
| 0x100E | R/- | actual log – maximal frequency CNT1 |
| 0x100F | R/- | actual log – upper 16 bits CNT2 |
| 0x1010 | R/- | actual log – lower 16 bits CNT2 |
| 0x1011 | R/- | actual log – actual frequency CNT2 |
| 0x1012 | R/- | actual log – average frequency CNT2 |
| 0x1013 | R/- | actual log – minimal frequency CNT2 |
| 0x1014 | R/- | actual log – maximal frequency CNT2 |

| Address | Access | Description |
|---|---|---|
| 0x1015 | R/- | actual log – line voltage in tens mV * |
| 0x1016 | R/- | actual log – station temperature in decimals ºC * |
| 0x1017 | R/- | actual log – analogy input value CIO1 * |
| 0x1018 | R/- | actual log – analogy input value CIO2 * |
| 0x1019 | R/- | actual log – analogy input value CIO3 * |
| 0x101A | R/- | actual log – analogy input value CIO4 * |
| 0x101B | R/- | actual log – analogy input value CIO5 * |
| 0x101C | R/- | actual log – reserve |
| 0x101D | R/- | actual log – reserve |
| 0x101E | R/- | actual log – reserve |
| 0x101F | R/- | actual log – reserve |
| 0x1020 | R/- | 2. log |
| 0x1040 | R/- | 3. log |
| ... | ... | ... |
| 0xAFE0 | R/- | 1280. log |

* CIO value validity is indicates by BIN array 15th bit.

## 2.17. XC-CNT/IEC 60870-5-104 protocol description

The DA4 automatically sends all logs to dispatching in M_SP_TB_1, M_ME_TF_1 and M_IT_TB_1 types telegrams after connection established. The DA4 can work up received commands C_IC_NA_1 (general inquiry), C_CS_NA_1 (time synchronization), C_SC_NA_1 (1-bit command without time) and C_SC_TA_1 (1-bit command with time).

### Data points

| IOA | Type | Description |
|---|---|---|
| 101 | M_SP_TB_1 | alarm – active level on input BIN1 |
| 102 | M_SP_TB_1 | alarm – active level on input BIN2 |
| 103 | M_SP_TB_1 | alarm – active level on input BIN3 |
| 104 | M_SP_TB_1 | alarm – active level on input BIN4 |
| 105 | M_SP_TB_1 | alarm – analogy input upper limit overrun AN1 |
| 106 | M_SP_TB_1 | alarm – analogy input lower limit overrun AN1 |
| 107 | M_SP_TB_1 | alarm – analogy input upper limit overrun AN2 |
| 108 | M_SP_TB_1 | alarm – analogy input lower limit overrun AN2 |
| 109 | M_SP_TB_1 | alarm – limit frequency overrun CNT1 |
| 110 | M_SP_TB_1 | alarm – limit frequency overrun CNT2 |
| | | |
| 201 | M_SP_TB_1 | input level BIN1 |
| 202 | M_SP_TB_1 | input level BIN2 |
| 203 | M_SP_TB_1 | input level BIN3 |
| 204 | M_SP_TB_1 | input level BIN4 |
| | | |
| 301 | M_ME_TF_1 | analogy input value AN1 |
| 302 | M_ME_TF_1 | analogy input value AN2 |
| | | |
| 401 | M_IT_TB_1 | counter status CNT1 |
| 402 | M_IT_TB_1 | counter status CNT2 |
| 411 | M_ME_TF_1 | counter actual frequency CNT1 |
| 412 | M_ME_TF_1 | counter actual frequency CNT2 |
| 421 | M_ME_TF_1 | counter average frequency CNT1 |
| 422 | M_ME_TF_1 | counter average frequency CNT2 |
| 431 | M_ME_TF_1 | counter minimal frequency CNT1 |

| IOA | Type | Description |
|---|---|---|
| 432 | M_ME_TF_1 | counter minimal frequency CNT2 |
| 441 | M_ME_TF_1 | counter maximal frequency CNT1 |
| 442 | M_ME_TF_1 | counter maximal frequency CNT2 |
| | | |
| 501 | M_ME_TF_1 | analogy input value CIO1 |
| 502 | M_ME_TF_1 | analogy input value CIO2 |
| 503 | M_ME_TF_1 | analogy input value CIO3 |
| 504 | M_ME_TF_1 | analogy input value CIO4 |
| 505 | M_ME_TF_1 | analogy input value CIO5 |
| | | |
| 601 | M_ME_TF_1 | power supply [V] |
| 602 | M_ME_TF_1 | link voltage [V] |
| 603 | M_ME_TF_1 | station temperature [ºC] |

Note.: The quantity of the send data points is depends on XC-CNT module firmware, alarms permit of the singles inputs and parameters “send alarms status only” and “send all values CIO”.

### *Commands*

| IOA | Type | Description |
|---|---|---|
| 2201 | C_SC_NA_1/ C_SC_TA_1 | output control OUT1 |
| | | |
| 2501 | C_SC_NA_1/ C_SC_TA_1 | output control CIO1 |
| 2502 | C_SC_NA_1/ C_SC_TA_1 | output control CIO2 |
| 2503 | C_SC_NA_1/ C_SC_TA_1 | output control CIO3 |
| 2504 | C_SC_NA_1/ C_SC_TA_1 | output control CIO4 |
| 2505 | C_SC_NA_1/ C_SC_TA_1 | output control CIO5 |

## 2.18. XC-CNT/myIO protocol description

The XC-CNT MyIO protocol is communications protocol of the XC-CNT firmware for data transmition on web dispatching. By the help of this protocol the dispatching software configures the module software, read her buffer, controls binary output and switches off main station power supply.

The XC-CNT MyIO protocol is client/server type. It behaves as client which it connects on dispatching server by the help of TCP connection in periodic time. As transport layer is used HTTP protocol. Dispatching server has the static IP address.

The one communications relation has the following process: the client establish HTTP connection on server and by the help of method POST it send all its data. Server receive data and it send answer which it has up to 3 independent blocs: confirmation, output set up and configuration. The compulsory is only confirmation block, other blocks the server sends if it is need. In the end the client finish connection and it start count out time to next relation.

## 2.19. XC-CNT/SMS protocol description

The DA4 automatically sends all logs in SMS messages on telephone number after defined time.

### Outgoing SMS format

*YYYY*-*MM*-*DD hh*:*mm*:*ss* **A=***alarms* **V=***voltage* **B1=***bin* **B2=***bin* **B3=***bin* **B4=***bin* **A1=***analog* **A2=***analog* **C1=***count*,*freqact*,*freqavg*,*freqmin*,*freqmax* **C2=***count*,*freq*,*freqavg*,*freqmin*,*freqmax*

*YYYY* – year (1900-2036).
*MM* – month (01-12).
*DD* – day (01-31).
*hh* – hours (00-23).
*mm* – minutes (00-59).
*ss* – seconds (00-59).
*alarms* – alarms status in hexadecimal format (0000-FFFF).

- *bit 0* – active level on input BIN1
- *bit 1* – active level on input BIN2
- *bit 2* – active level on input BIN3
- *bit 3* – active level on input BIN4
- *bit 4* – analogy input upper limit overrun AN1
- *bit 5* – analogy input lower limit overrun AN1
- *bit 6* – analogy input upper limit overrun AN2
- *bit 7* – analogy input lower limit overrun AN2
- *bit 8* – limit frequency overrun CNT1
- *bit 9* – limit frequency overrun CNT2
- *bit 10* – active level on input CIO1
- *bit 11* – active level on input CIO2
- *bit 12* – active level on input CIO3
- *bit 13* – active level on input CIO4
- *bit 14* – active level on input CIO5
- *bit 15* – power supply failure

*voltage* – power supply in volts (0.00-21.45).
*bin* – binary input status (0-1).
*analog* – precalculate analogy input value (-32768 – 32767).

*count* – counter status (0-4294967295).
*freqact* – actual frequency (0-65535).
*freqavg* – average frequency (0-65535).
*freqmin* – minimal frequency (0-65535).
*freqmax* – maximal frequency (0-65535).

Note.: The date, time, alarms status and power supply are sends in SMS always. Other values are sends only if given input is supports by XC - CNT module firmware.

### *Example of the send SMS:*

2006-01-16 09:15:40 A=0008 V=15.62 B1=1 B2=1 B3=0 A1=35 A2=3527 C1=12614,4,4,3,5

### *Configuration*

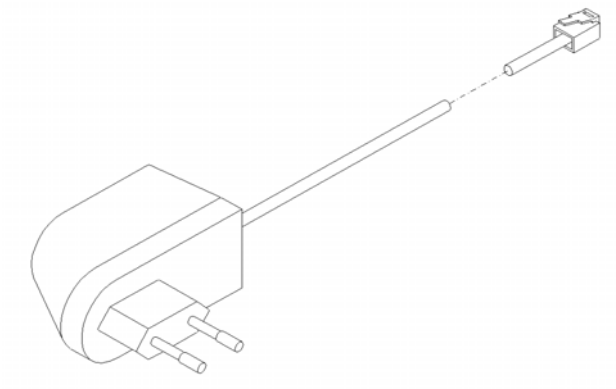
- GPRS connection establishing can disallow by entry empty APN.
- In case of the SMS illegality on some telephones, it is possibility switch the SMS format on 7-bit (only for firmware from 16.10.2007 and older)

## *2.20. Standard accessories*

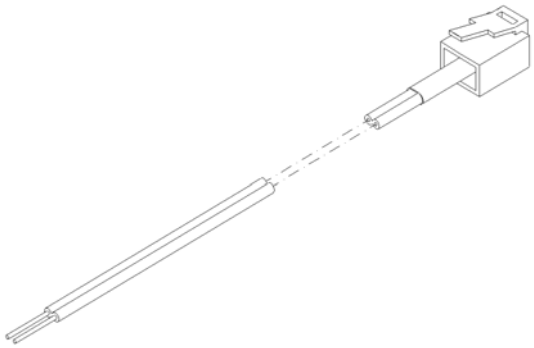
1. RJ12 supply connector for supply voltage cable.
2. Three RJ45 connectors for data cables and CIO connection.
3. Compliance certificate.
4. Complaint procedure.
5. Warranty.
6. User manual

## *2.21. Additional accessories*

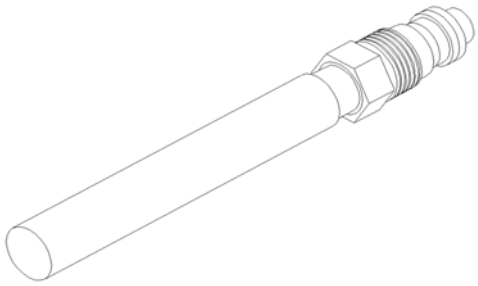
1. Supply adapter



2. AO-DA4-PWRC supply cable



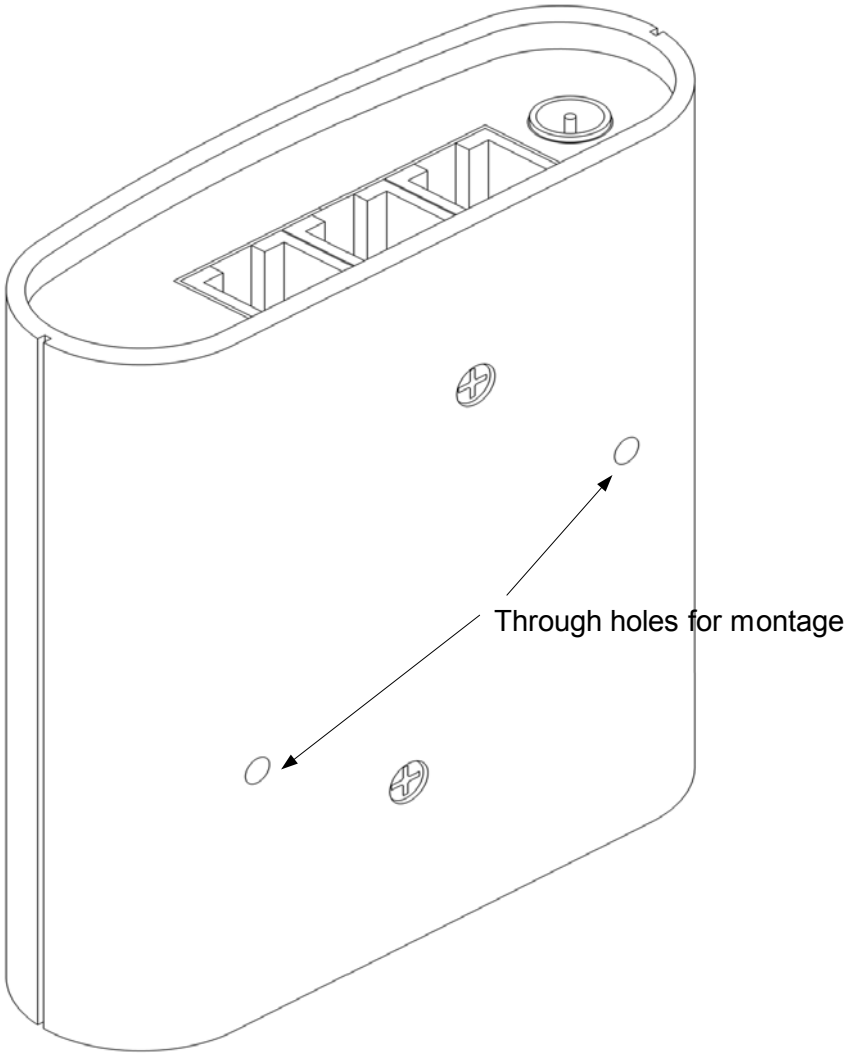
3. AO-AGSM-FME-V antenna



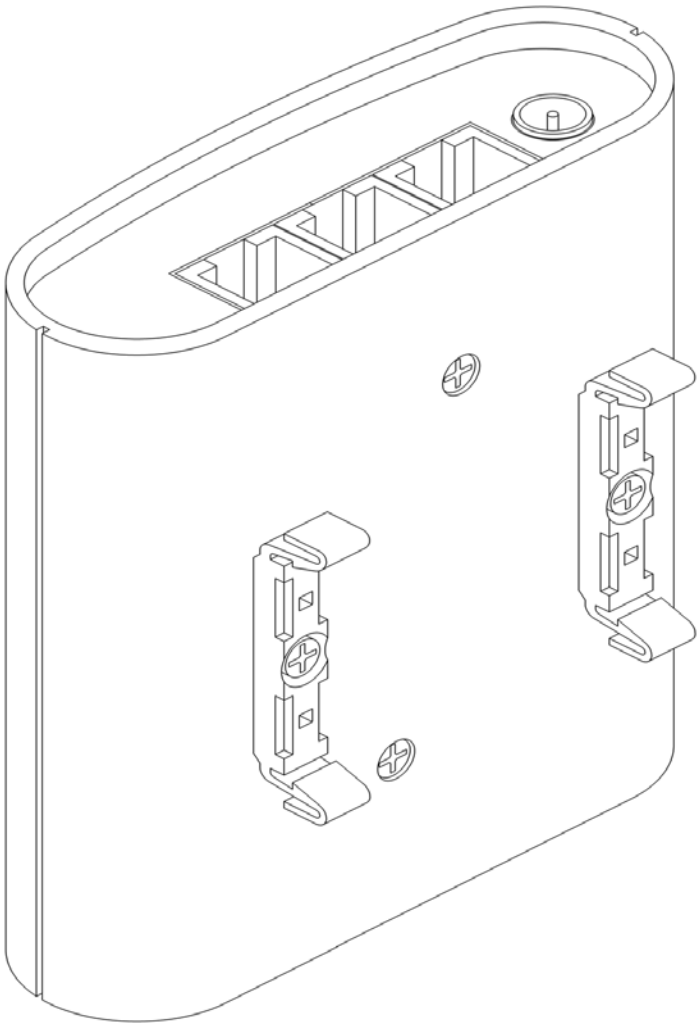
## 2.22. Assembly procedure

GSM Datalogger DA4 is designed as a standard for:

1. Assembly to a panel using the through holes.

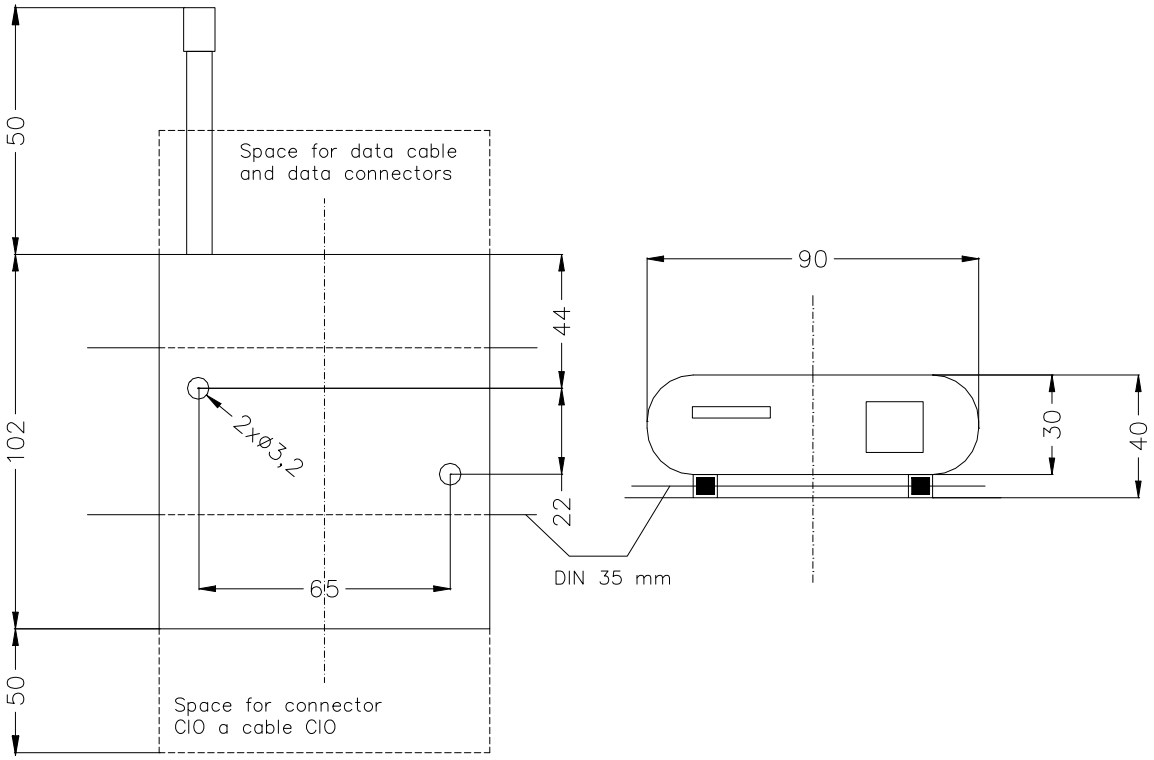


2. DIN 35 mm rail assembly using plastic grips.



3. To be put on a worktop

## 2.23. Mechanical external dimensions and mounting recommendations



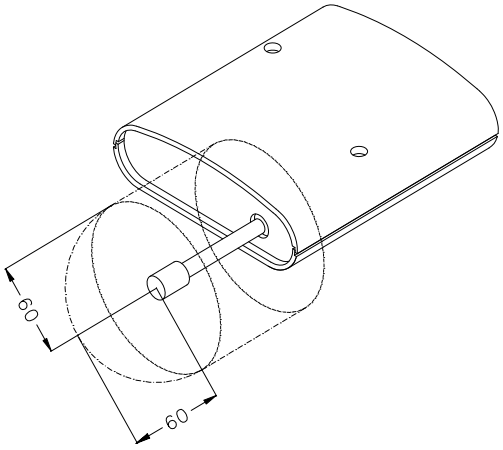

For the majority of applications with a built-in modem in a switch board it is possible to recognize two sorts of environments :

- non public and industry environment of low voltage with high interference,
- public environment of low voltage without high interference.

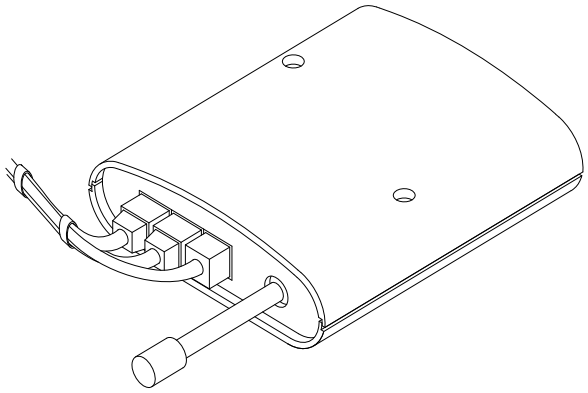
For both of these environments it is possible to mount modems to the switch board, which it doesn't need to have no examination immunity or issues in connection with EMC according to EN 60439-1+A1.

For compliance of EN 60439 - 1 + A1 specification it is necessary observe next assembly of the modem to the switch - board:

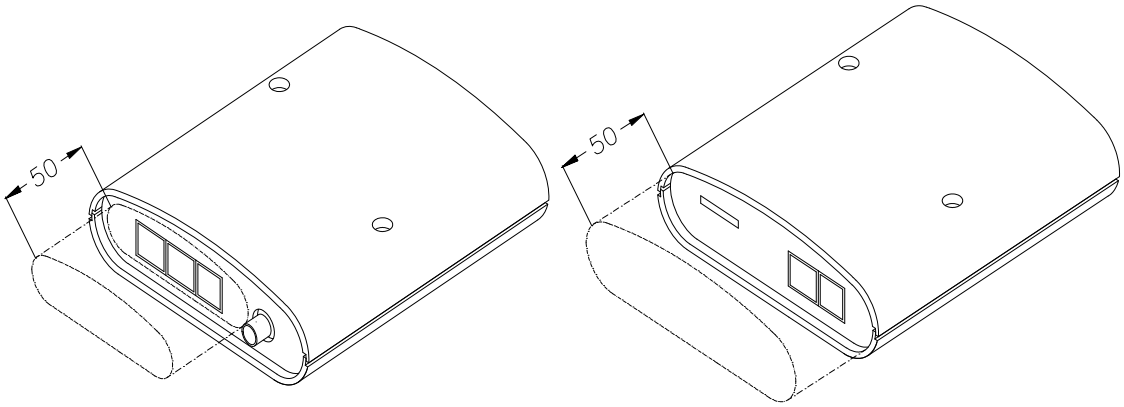
- round antenna we recommend to observe a distance of 6 cm from cables and metal surfaces on every side according to the next picture due to the elimination of interference, while using an external antenna except for the switch-board it is necessary to fit a lightening conductor,
- before mounting a modem on sheet-steel we recommend using an external antenna,



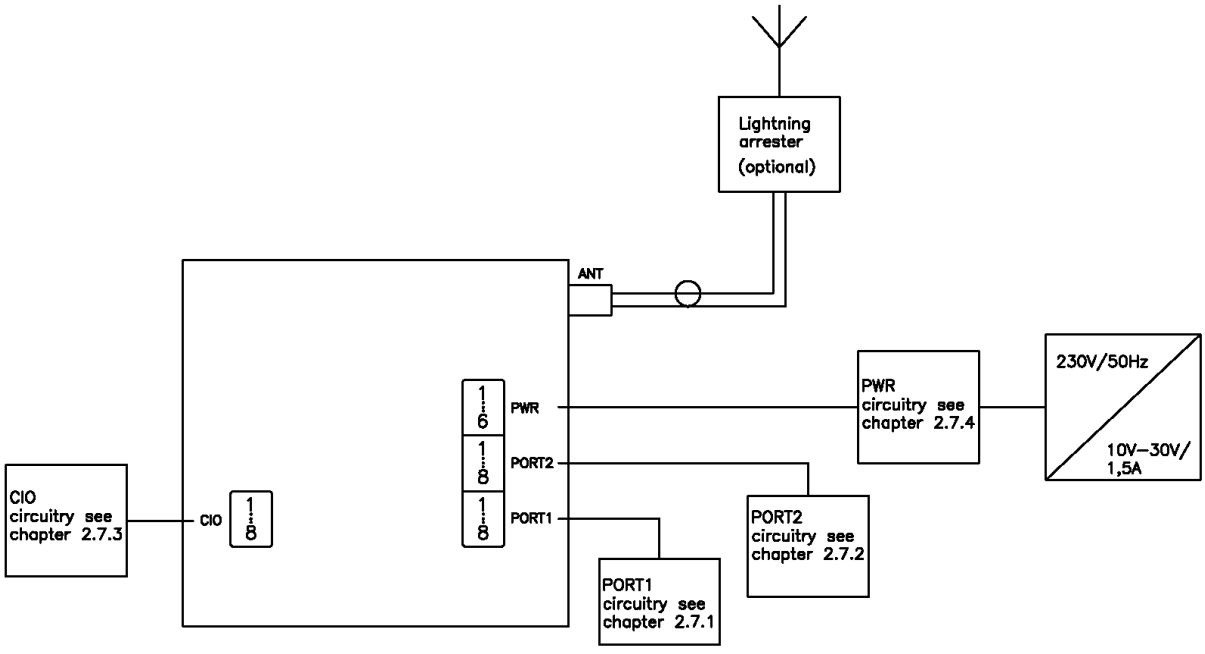

- for single cables we recommend to bind the bunch according to the following picture, for this use we recommend:
  - length of the bunch (combination of power supply and data cables) can be maximum 1,5 m, if length of data cables exceeds 1,5 m or in the event of, the cable leads towards the switch - board, we recommend to use fit over - voltage protectors (surge suppressors),
  - with data cables they mustn't carry cables with reticular tension ~ 230 V/50 Hz,
  - all signals to sensors must be twisted pairs.



- sufficient space must be left before individual connectors for handling of cables,




- for correct function of the modem we recommend to use in switch - board earth-bonding distribution frame for grounding of power supply of modem, data cables and antenna,
- in case of optical sensors usage, we recommended properly close covers of a sensors because of overload by surrounding light, this case may result in wrong measurement,
- the circuit diagram of the modem is on the following pictures.

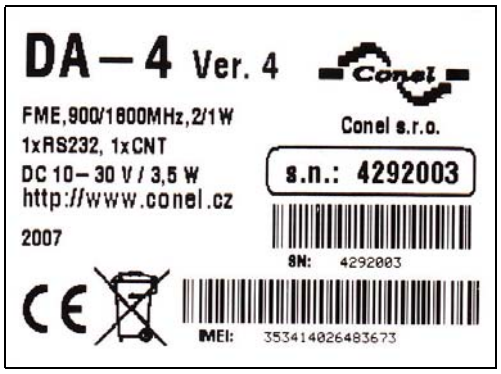


## 2.24. Product marking

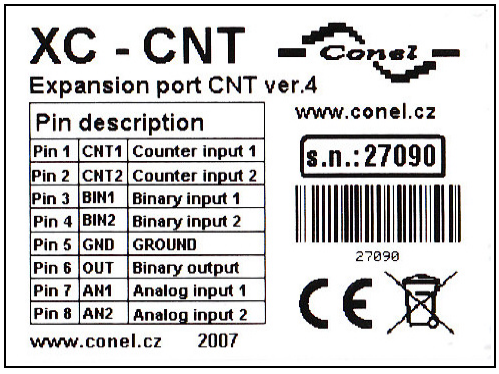
| | |
|---|---|
| **G** | ***Communications GSM-GPRS*** |
| **M** | Protocol MODBUS RTU |
| **R** | Protocol RDS 92 |
| **I** | Protocol IEC 60870-5-104 |
| **X** | Other – the customers specification |
| **S** | ***Communications GSM-SMS*** |
| **S** | Protocol SMS1 |
| **M** | Serial interface M-BUS |
| **V** | HW interface inputs and outputs withs configuration |
| **1a** | Input AN1 - analogue |
| **1n** | Input AN1 - disabled |
| **2a** | Input AN2 - analogue |
| **2n** | Input AN2 - disabled |
| **3b** | Input BIN1 - binary |
| **3c** | Input BIN1 - counter |
| **3d** | Input BIN1 + Input BIN2 – bidirectional counter |
| **3n** | Input BIN1 - disabled |
| **4b** | Input BIN2 - binary |
| **4c** | Input BIN2 - counter |
| **4d** | Input BIN1 + Input BIN2 – bidirectional counter |
| **4n** | Input BIN2 - disabled |
| **5b** | Input BIN3 - binary |
| **5n** | Input BIN3 - disabled |
| **6b** | Input BIN4 - binary |
| **6n** | Input BIN4 - disabled |
| **7o** | Output OUT1 - enabled |
| **7d** | Output OUT1 - injector by counter at BIN1 |
| **7n** | Output OUT1 - disable |
| **S** | Basic mounting, IP20 |
| **Z** | Pillar SIS 1h to field applications |
| **R** | Small switch board IP54 |
| **L** | Switching board IP54 on post or wall |
| **V** | Big switch board IP54 |
| **O** | Pb accumulator, eff. life min. 10 years, charging 2 years |
| **L** | Lithium battery, eff. Life 4 years for outdoor applications |
| **V** | Power supply from street lighting |
| **N** | Power supply from LV (low voltage) |

Examples: GMV-1n2n3c4n5n6n7o-SO or SSM-RL

### 2.25. GSM Datalogger DA4 production label

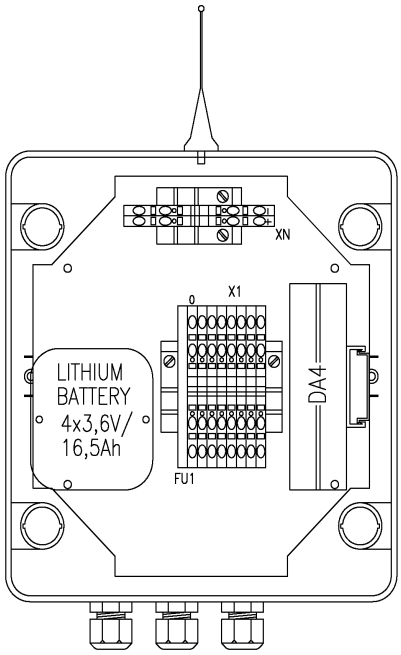



### 2.26. Production label of interfaces PORT2

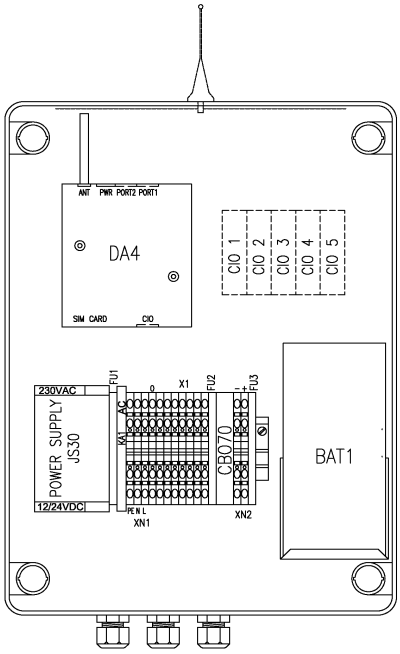


# 3. Switch boards

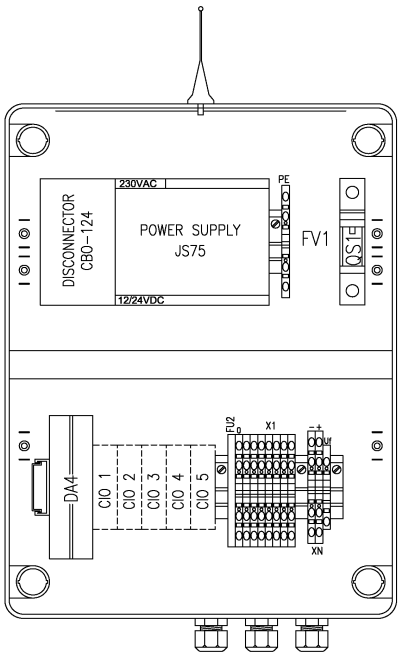
The GSM Datalogger DA4 is possible place to few switch boards.



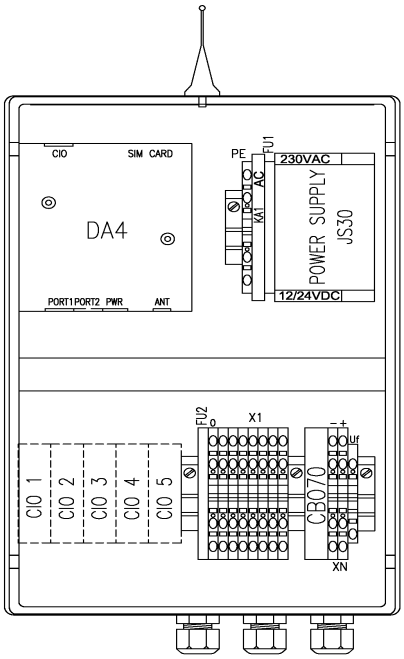

**R type board**
**205x220x140mm**



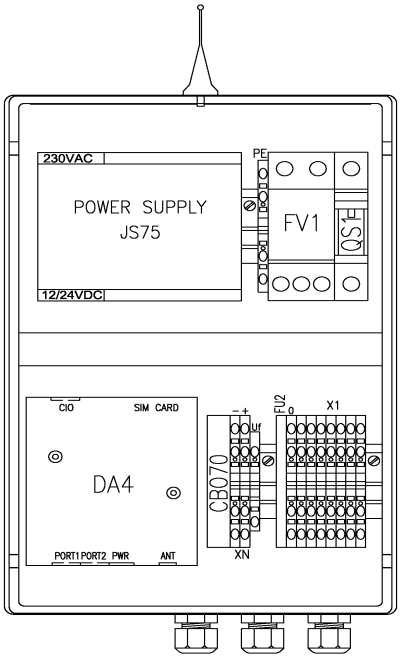

**VN type board**
**275x370x140mm**



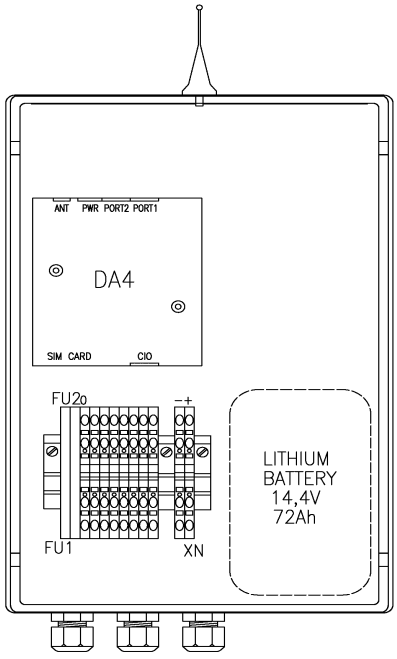

**VV type board**
**275x370x140mm**




**ZN type board**
**205x319x118mm**




**ZV, LV type board**
**205x319x118mm**

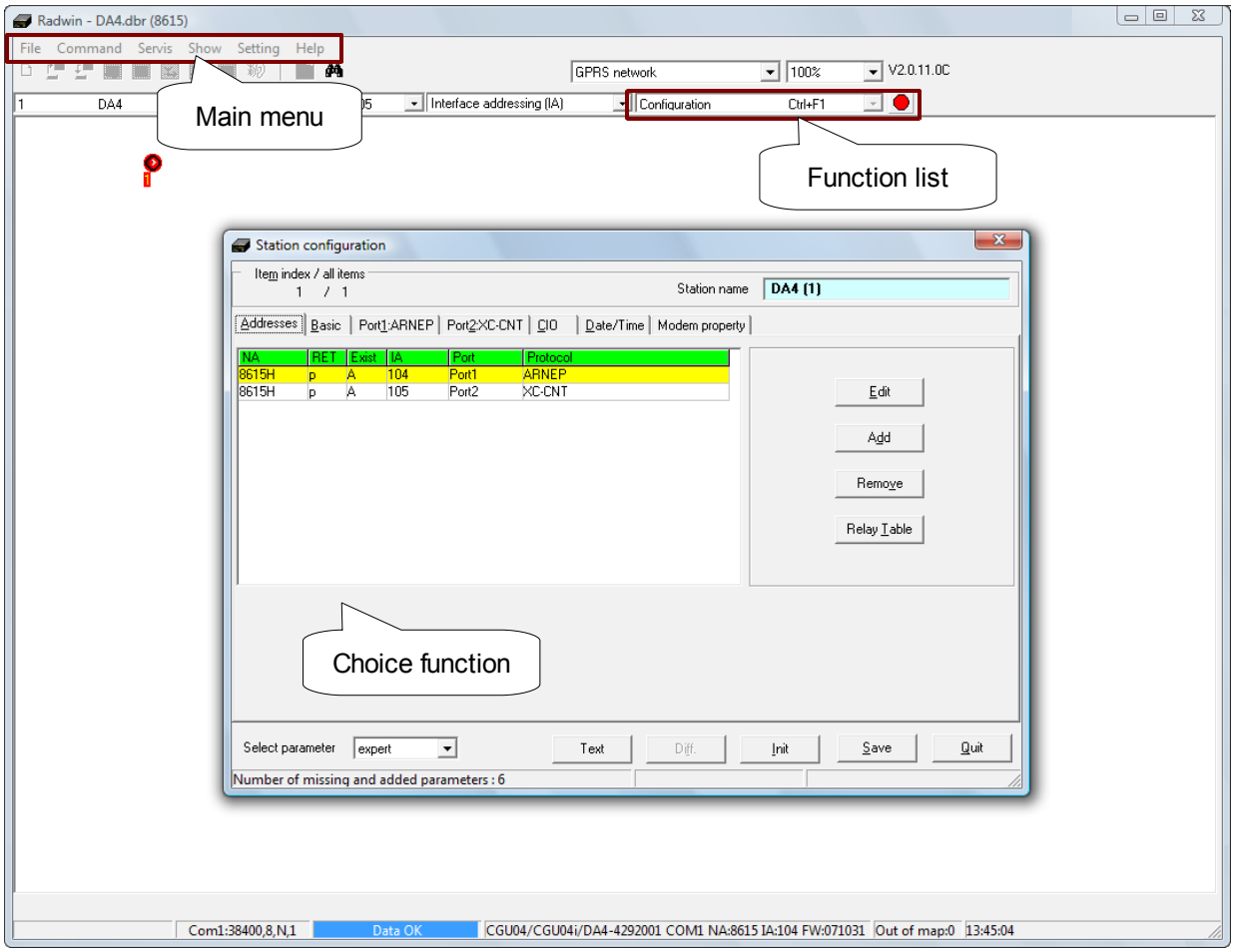



**ZL, LL, ZO, LO type board**
**205x319x118mm**

# 4. Configuration setting

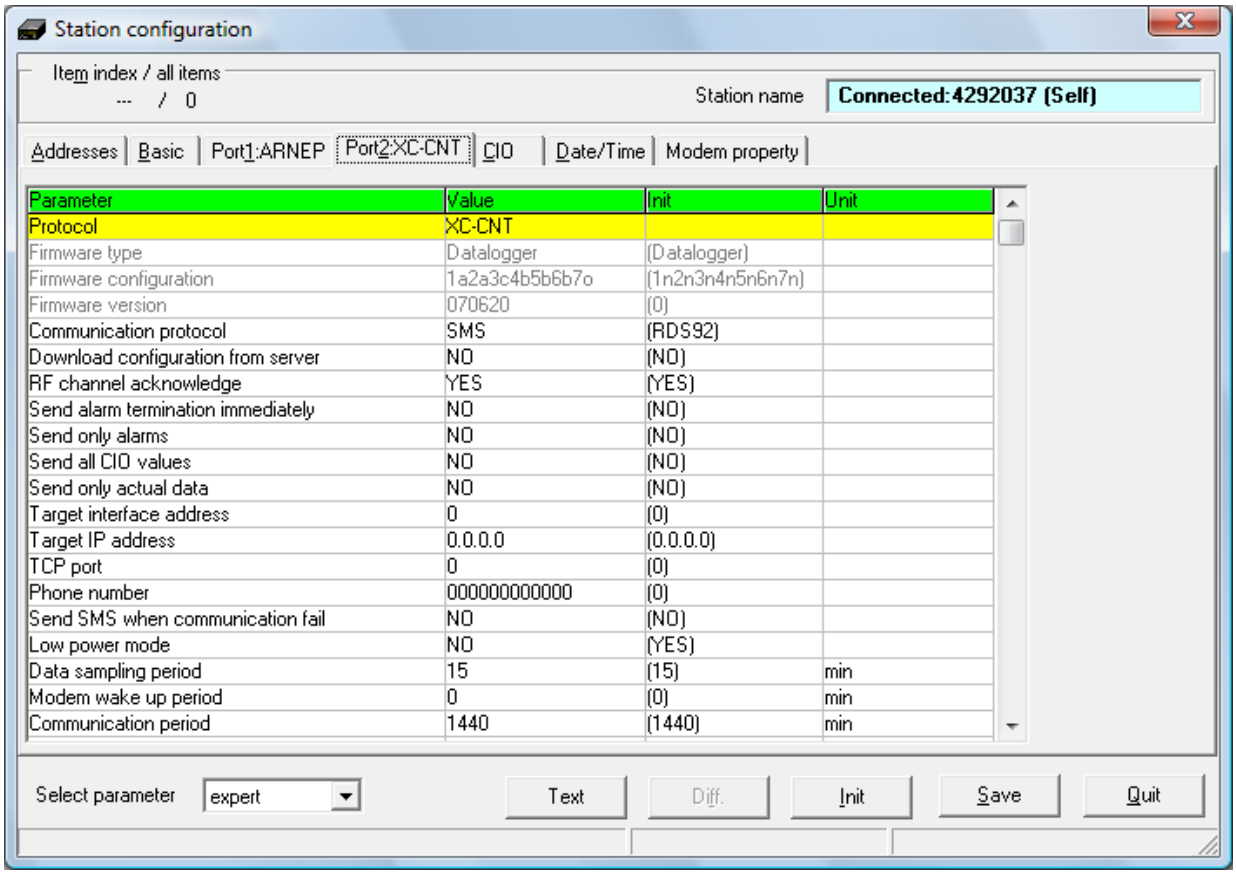
**Attention!** If the SIM card isn't included in the GSM Datalogger DA4, it is impossible for the GSM Datalogger DA4 to operate. The Included SIM card must be activated for GPRS transmissions. Insert the SIM card when the GSM Datalogger DA4 is switched off.

For monitoring of status, configuration and administration of the GSM Datalogger DA4 is RADWIN program **[3]**. In left top of the program window is main menu. In right under main menu is function list which can do on GSM Datalogger. More informations is in help for this program.



## 4.1. The basic configuration of the GSM Datalogger DA4

The basic configuration is in ***Function list*** where it is choose function ***Configuration*** (shortcut ***Ctrl + F1***). After double click on parameter it is possible value change.




***Protocol XC-CNT parameters description***

| Name | Value | Description |
|---|---|---|
| NA (HEX)/IA 1 | | Set network address and interface address |
| Protocol | | Name of the user's protocol (XC-CNT) |
| Port type | | Modem port type information |
| Firmware type | | Firmware type in XC-CNT module |
| Firmware configuration | | Inputs and outputs configuration firmware in XC-CNT module |
| Firmware version | YYYYMMDD | Firmware version date in XC-CNT module |
| Communication protocol | | Communicates protocol, which will send or read data |
| Download configuration from server | | After configuration set via web interface, |

| | | |
|---|---|---|
| | | target IP address set and this parameter set the configuration will download from server and upload to the DA4 |
| RF channel acknowledge | YES, NO | Message confirmation permitting on AGNEP protocol level |
| Send alarm termination immediately | YES, NO | If it is alarm end, record will permitting to send at once |
| Send only alarms | YES, NO | Permitting of the switch alarm on status sending only |
| Send all CIO values | YES, NO | Permitting of the all measured CIO values send (temperature, 2x voltage,<br>5x input analogy) in the each record (SMS protocol out of own line) |
| Send actual data only | YES, NO | Permitting of actual data sending only |
| Target interface address | 0 – 65534 | Target modem address, on which datalogger will send read data, or ASDU address in protocol IEC 60870-5-104 |
| Target IP address | xxx.xxx.xxx.xxx | The IP address of the server from which DA4 configuration will download |
| TCP port | 0 – 65535 | TCP port of the IEC 60870-5-104 protocol |
| Phone number | 12 point number without introductory + | Telephone number, where it will send read data in case of SMS protocol choice or informative SMS in case of communication failed |
| Send SMS when communication fail | YES, NO | Permitting of the “GPRS FAILURE” SMS in case of communication failed (SMS protocol out of own line) |
| Low power mode | YES, NO | Permitting of the switch sleep mode on (XC-CNT module automatically switches main power supply off) |
| Data sampling period | 0 – 65535 min | Period, which XC-CNT module stores samples to our buffer. After buffer saturation it is switch main modem power supply on short time and data are read to redundancy RAM memory. If it is not activate sleep mode, then data will read continuously |
| Modem wake-up period | 0 – 65535 min | Period, after which main power supply is switch on by XC-CNT module. Parameter will have mean, if it is need supplement CIO values to measured samples with defined period |
| Communications period | 0 – 65535 min | Period, which the read data are send. |

| | | |
|---|---|---|
| | | Period isn't comply only in case that it is record new alarm, which it is send at once |
| Retry communication period | 0 – 255 min | Period, which the read data will resend, if data aren't permit or it isn't exhaust maximal attempt number |
| Max transmit retry | 1 – 5 | Maximal attempts number of the data send to target modem |
| Online time | 0 – 255 min | Time, which main modem power supply will switch on |
| BINx – allow | YES, NO | Binary input permitting (according to firmware configuration in XC-CNT module) |
| BINx – active level | Log1, Log0 | Logical level, which it is signals alarm |
| BINx – alarm on active level | YES, NO | Permitting of alarm elicitation behind active level |
| ANx – allow | YES, NO | Analogy input permitting (according to firmware configuration in XC-CNT module) |
| ANx – sample period * | 0 – 65535 sec | Input value sampling period. In case of zero value, measuring circuit is switch on permanently and input is samples every seconds. In case of non-zero value, measuring circuit is switch on only in defined time by following parameter |
| ANx – switch meas. circuit on time * | 16 – 375 msec | Measuring circuit switch on time and A/D converter activation |
| ANx – sample number for averaging | 1 – 16 | Samples number from which average value is quantifies |
| ANx – multiplicative constant | 1 – 65535 | Calibration coefficient |
| ANx – additive constant | -32768 – 32767 | Calibration coefficient |
| ANx – hysteresis | 0 – 32000 | Hysteresis value for evaluation of the defined limits overrun |
| ANx – lower limit | -32768 – 32767 | Lower limit of signal alarm |
| ANx – upper limit | -32768 – 32767 | Upper limit of signal alarm |
| ANx – lower limit overrun alarm | YES, NO | Permitting of the overrun limit alarm invoking |
| ANx – upper limit overrun alarm | YES, NO | Permitting of the overrun limit alarm invoking |
| CNTx – allow | YES, NO | Counter input permitting (according to firmware configuration in XC-CNT |

| | | |
|---|---|---|
| | | module) |
| CNTx – full duplex | YES, NO | Full duplex counter input permitting (according to firmware configuration in XC-CNT module) |
| CNTx – multiplicative constant | 1 – 65535 | Coefficient for flow calculation calibration |
| CNTx – flow upper limit | 0 – 65535 | Flow upper limit of signal alarm |
| CNTx – limit overrun time | 0 – 65535 sec | Time after which must be overrun flow upper limit to alarm signal |
| CNTx – time for measurement reset | 0 – 255 sec | Time after which will zero momentary flow, if input status is unchanged |
| CNTx – upper limit overrun alarm | YES, NO | Permitting of the overrun limit alarm invoking |
| OUT1 – enabled | YES, NO | Binary output permitting (according to firmware configuration in XC-CNT module) |
| OUT1 – idle level | Log1, Log0 | Logical level, to which is return output after power supply failure |
| OUT1 – automatic feeder control | YES, NO | Automatic injector control permitting (according to firmware configuration in XC-CNT module) |
| OUT1 – number of impulses on BIN1/CNT1 | 1 – 65535 | Impulses number on BIN1/CNT1 input after it is created impulse on output |
| OUT1 – impulse duration | 0,125 – 8 sec | Created impulse length |
| CIOx – alarm on active level | YES, NO | Permitting of alarm elicitation behind active level |
| PWR – alarm on active level | YES, NO | Permitting of alarm elicitation behind active level |
| External configuration of protocol | | Setting of sending information SMS, see the chapter ***3.2*** |

* both XC-CNT module analogy inputs are sampling at once – it is use smaller from set sample period and bigger from set measuring circuit switch time on.

## 4.2. External protocol XC-CNT configuration

The external protocol XC-CNT configuration enables set informations SMS sending parallel with set protocol in configuration on the PORT2.

The SMS are sent at alarms on binary/counter and analogy inputs, on CIO or at power supply fail. It can send the SMS up to six telephone numbers when it is possible independent define on which telephone number will send alarms. The every alarms can has a name.

Sent SMS has form:

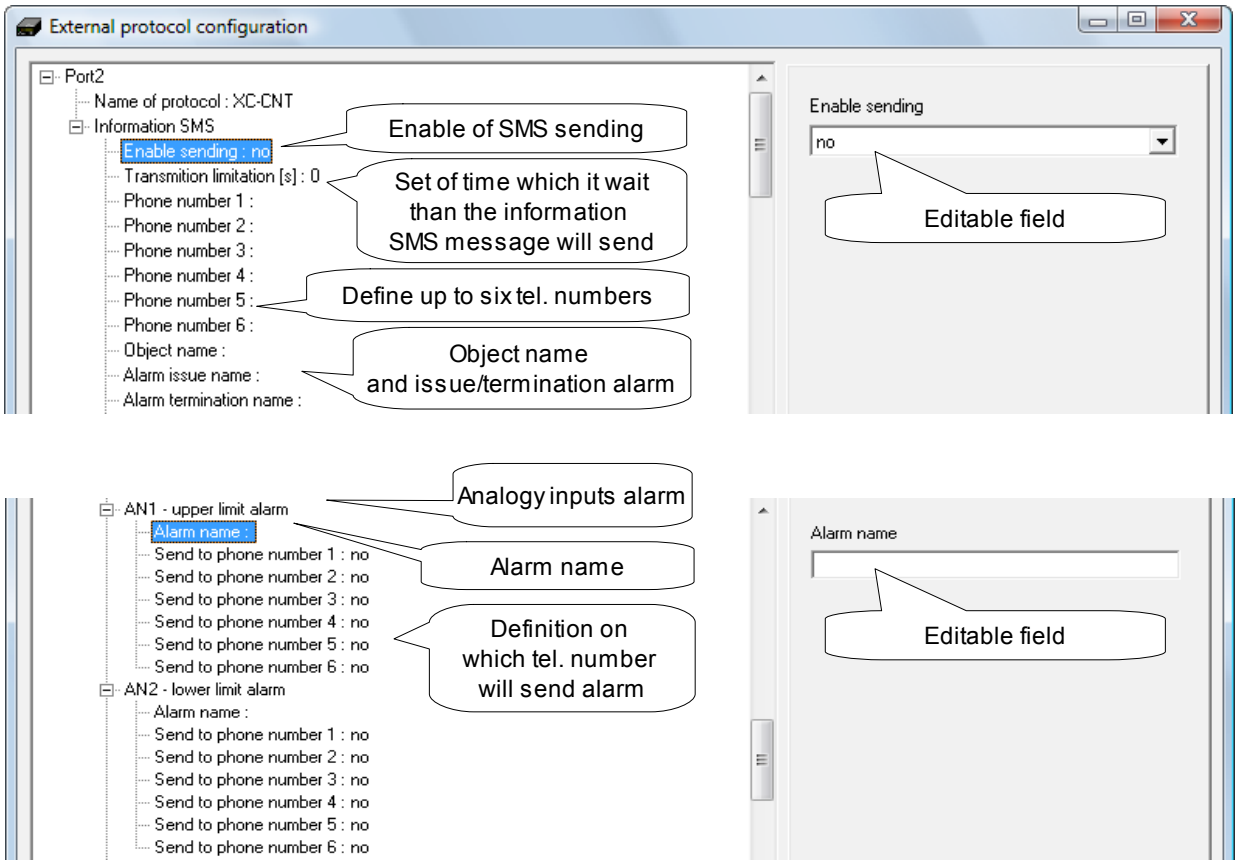
***<Object name> <Alarm issue/termination name> <Alarm name>***

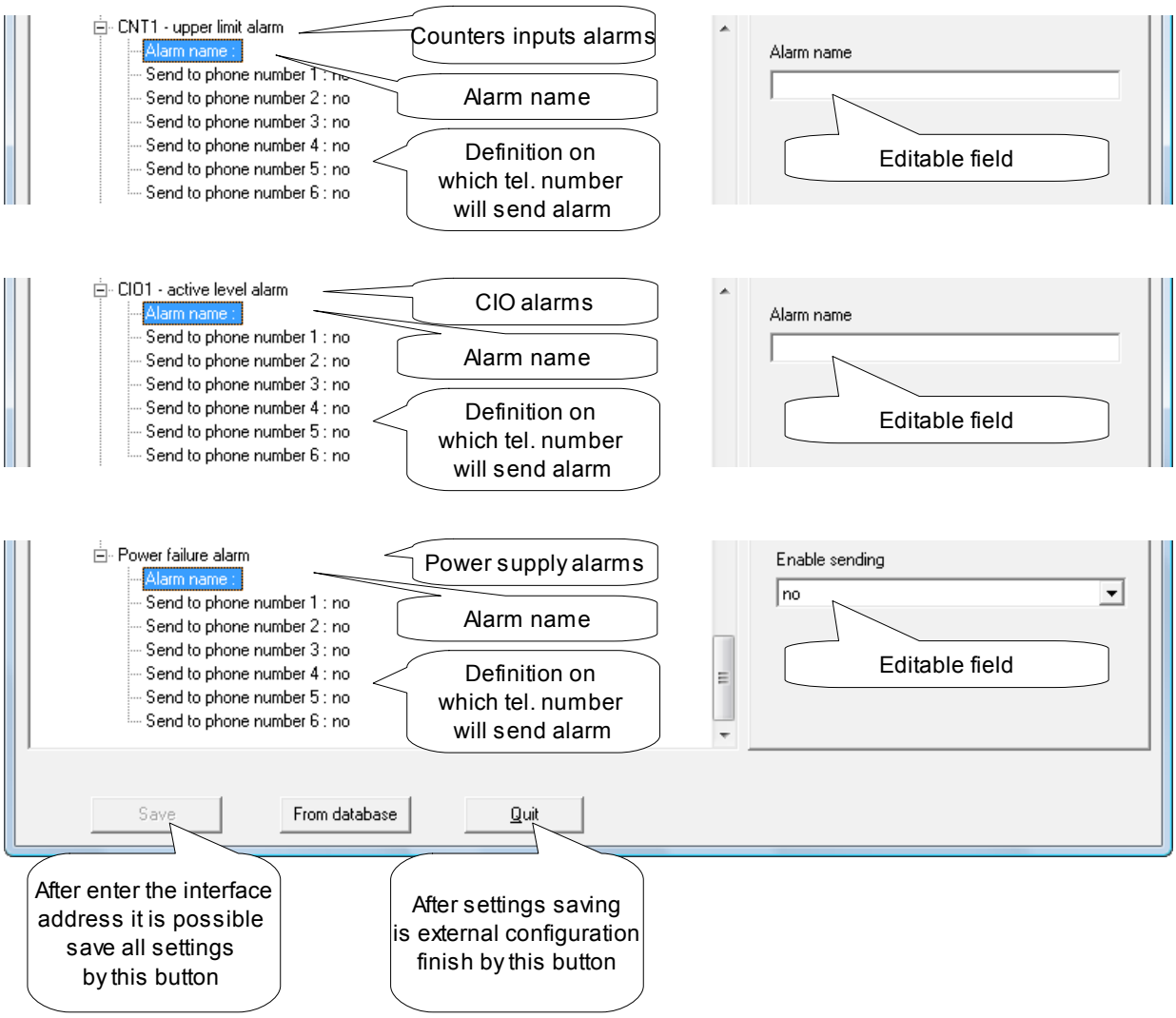
where the items are from itself separated by space and every item can has maximal 80 characters. The all SMS can has maximal 160 characters. In case of item ***Alarm issue/termination name*** undefined is send alarm issue only.

**Attention!** For saving of SMS sending settings is important use the database or enter interface address on PORT2 (the interface address configuration is in function ***Configuration*** in Addresses tap).

After parameter select, for example ***Enable sending***, in left part of protocol configuration, is in right part editable field where is possible parameter editing.

The parameter ***Transmition limitation [s]*** set time, after which it wait than the information SMS will send. This parameter is efficient set in cases when it isn't desired sending of the few same information SMS, e.g. during oscillating of the switch on the binary input. Maximal value of this parameter is 255 s.






The telephone numbers, on which are send information SMS, is possible configure by the help of configuration SMS send on appropriate GSM Datalogger DA4. The configuration SMS has form:

***<password> SET<x> <number>***

where: ***<password>*** is password to GSM Datalogger DA4 (implicitly it is serial number),

***SET<x>*** set appropriate telephone number,

***<number>*** is new telephone number on which the information SMS will send.

***Example: 123456 SET2 420123456789***

where 123456 is password to station, SET2 set 2nd telephone number on 420123456789.

## 4.3. GSM Datalogger DA4 monitoring

In main menu ***Service*** item ***DA4*** is possible see GSM Datalogger DA4 status.

This window has few parts:

- Binary inputs – there is active inputs signalization, eventually alarm on active level signalization.
- Diagnostic – there is DC voltage status, in the case of power supply backup AC voltage status and temperature inside modem.
- Set output – possibility to switch on or switch off output, switch on or switch off is signalized in information line in window bottom.
- Analogy inputs – there are actual statuses on analogy inputs, in the case of upper or lower limit overrun is can see alarm field.

- CIO – there is I/O signals status.
- History – there are all last possible obtained statuses of the GSM Datalogger DA4, at click on log it can see statuses of the inputs and outputs.
- Counter inputs – there is counter state which after click on button ***Setting*** is possible set (reset), flow, average flow, minimal and maximal flow, eventually alarms at flow overrun.
- Read new value – GSM Datalogger DA4 status is possible read only one shot or cyclic. The period of read is set in ***Setting*** -> ***Properties*** -> ***Common*** tap -> ***Rep. period***.
- Read history – pro find simplification of the GSM Datalogger DA4 status is possible move in history after ten logs. By button ***First 10*** is in panel ***History*** ten the newest actual data. By button ***Next 10*** is can see older data.
- By button ***Configuration*** is possible basic configuration of the GSM Datalogger DA4, see chapter ***3.1***.
- By button ***Quit*** is the GSM Datalogger DA4 status and monitoring finished.
- Information line – display informations about switch on/switch off, successful/unsuccessful data read and clock.

## 4.4. Upload firmware to GSM Datalogger DA4

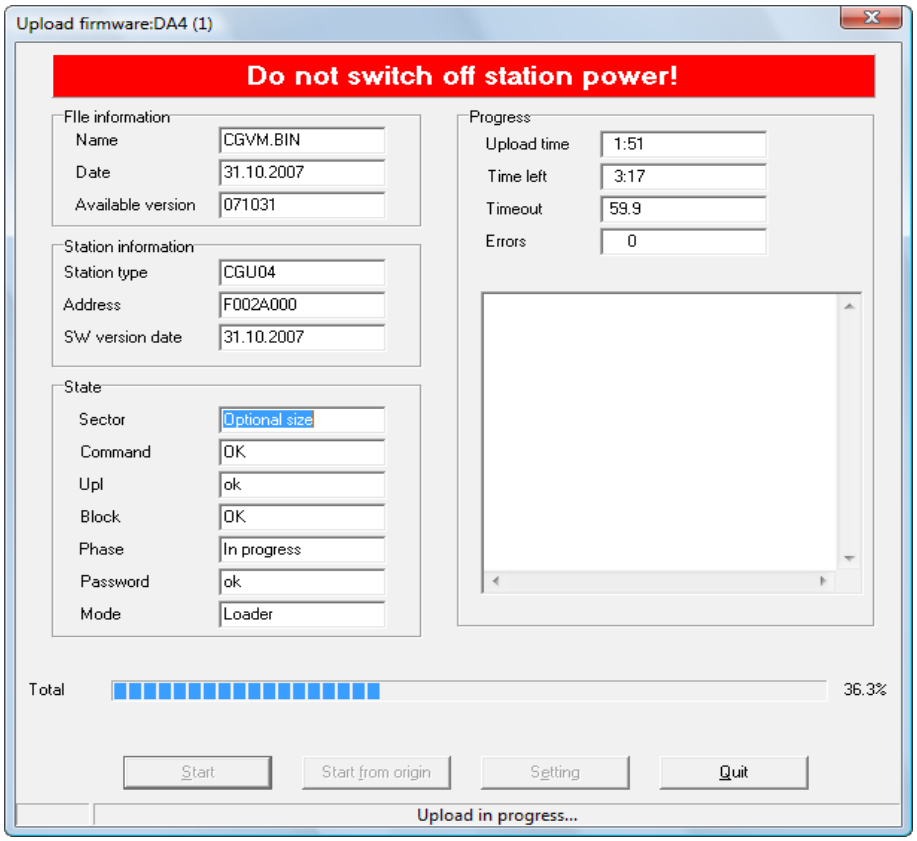
The firmware actualization is complex function which do program update in the GSM Datalogger DA4.

The new firmware (files CGVL.bin and CGVM.bin) is necessary copy to directory ***BIN*** in file where is installed RADWIN program in order to program RADWIN upload firmware into GSM Datalogger DA4.

**Attention!** Do not switch off station power at firmware upload to station else the GSM Datalogger DA4 can be damaged.

The function ***Upload firmware*** is in function list, see chapter ***3.1***.

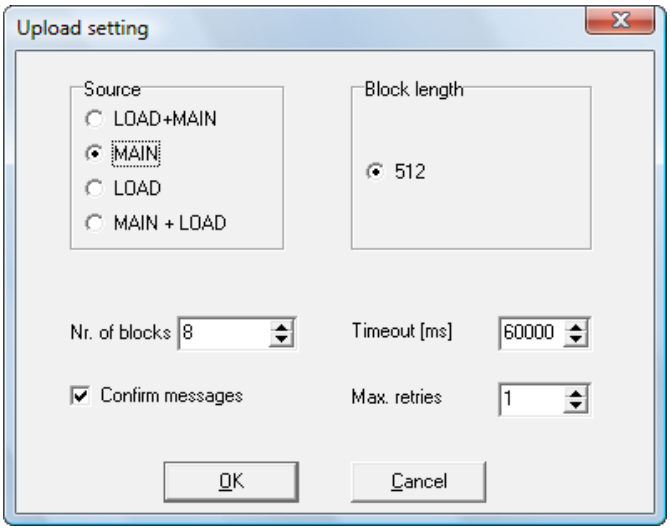
In window for upload firmware are set values and properties for firmware upload. In field ***File information*** is file name and date which is choose for upload into station. In field ***Station information*** is firmware date in station before upload, station type and address from them the firmware will upload. If in station is user created firmware then after date is character (u). In field ***State*** and ***Progress*** are next diagnostic data. In part ***Total*** is can see how long the upload is in progress.



***Button description***

| Button | Description |
|---|---|
| Start | Start firmware upload, version of firmware is compared. In case, when station firmware is newest or same as file in PC, dialogue give you chance to stop upload or continue next |
| Start from origin | Complete overwrite firmware in station |
| Setting | Setting of firmware upload |
| Quit | Close dialogue |

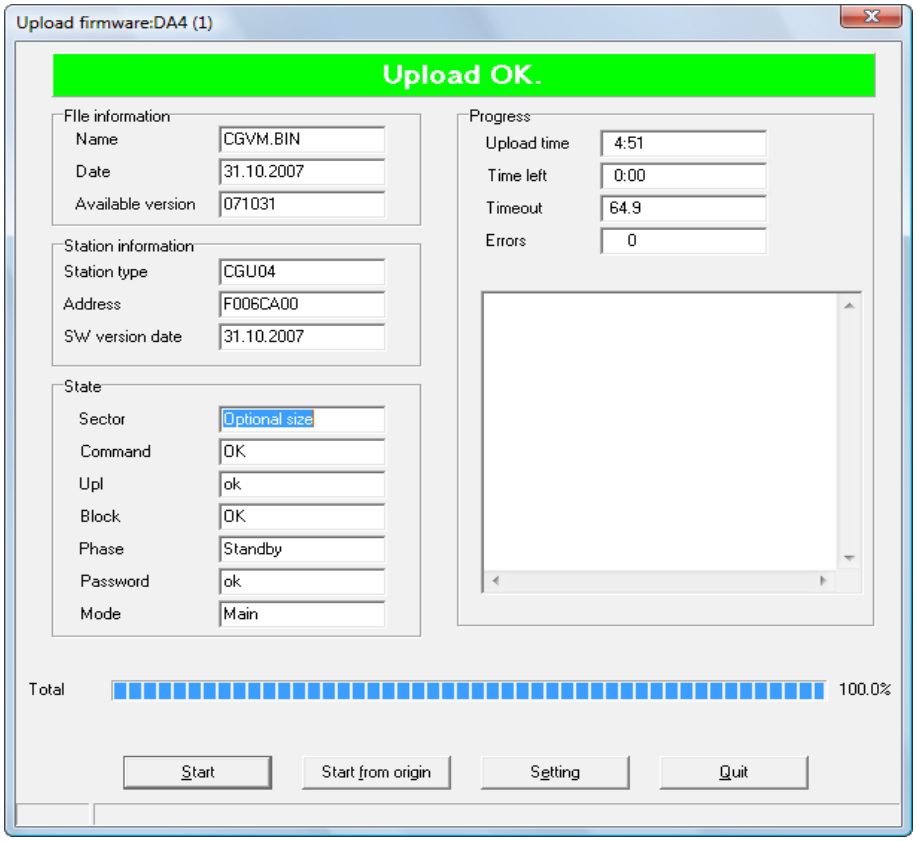
After click on button ***Setting*** is next window:




***Parameters description***

| Parameter | Description |
|---|---|
| Source | Select file type, typically MAIN for main file with full functionality and LOAD file with minimum functionality (only for firmware upload) |
| Nr. of blocks | Number of block before Radwin send upload state request |
| Confirm message | Select type of confirming. Unchecked means that Radwin checked only at the end of upload, checked means that Radwin checked every message |
| Block length | Number of bytes in message |
| Timeout | Timeout in ms for message delivery. If acknowledge is not delivered in this timeout, error message is displayed in dialogue and message is send again |

After click on button Start is firmware uploaded into GSM Datalogger DA4, after successful firmware upload into station is can see next window:




By button ***Quit*** is firmware actualization of the GSM Datalogger DA4 finished.

## 4.5. Programming XC-CNT firmware

PORT2 CNT of the GSM Datalogger DA4 is possible configure by the help of firmware, which can activate or disactivate appropriate input/output.

Firmware name has form ***V1x2x3x4x5x6x7x.hex*** where number description is:

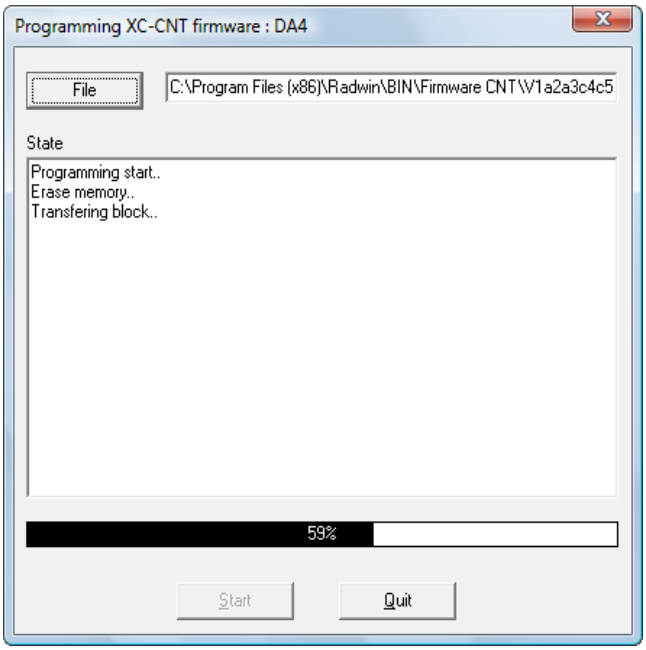
| Pin number | Description |
|---|---|
| 1a | Input AN1 - analogy – switch on |
| 1n | Input AN1 - switch off |
| 2a | Input AN2 - analogy – switch on |
| 2n | Input AN2 - switch off |
| 3b | Input BIN1 - binary – switch on |
| 3c | Input CNT1 - counter – switch on |
| 3d | Input CNT1 + CNT2 – bidirect flow |
| 3n | Input BIN1/CNT1 - switch off |
| 4b | Input BIN2 - binary – switch on |
| 4c | Input CNT2 - counter – switch on |
| 4d | Input CNT1 + CNT2 – bidirect flow |
| 4n | Input BIN2/CNT2 - switch off |
| 5b | Input BIN3 - binary – switch on |
| 5n | Input BIN3 - switch off |
| 6b | Input BIN4 - binary – switch on |
| 6n | Input BIN4 - switch off |
| 7o | Output OUT1 – switch on |
| 7d | OUT1, control feeder according to input 3 |
| 7n | Output OUT1 – switch off |

***Example:*** after firmware upload V1a2a3b4b5b6b7o.hex the PORT2 CNT will have configuration:

| Pin number | Description |
|---|---|
| 1a | Input AN1 - analogy – switch on |
| 2a | Input AN2 - analogy – switch on |
| 3b | Input BIN1 - binary – switch on |
| 4b | Input BIN2 - binary – switch on |
| 5b | Input BIN3 - binary – switch on |
| 6b | Input BIN4 - binary – switch on |
| 7o | Output OUT1 – switch on |

The function ***Programming XC-CNT firmware*** is in main menu ***Service***, see chapter ***3.1***.

In the window for programming firmware is by button ***File*** choice appropriate configuration firmware for the PORT2 CNT. In field ***State*** are other diagnostic states with rail where is programming time.




After successful ***Programming XC-CNT firmware*** is function finished by button ***Quit***.

# 5. Quality of the GPRS signal

The AGNES system works with the aid of the GSM network. The AGNES stations contain GSM-GPRS modules, which are on the radio channel connected to a certain GSM cell. Its signal can be evaluated with the aid of this function.
The function is used first of all when installing the station and checking its function. From the obtained information, the following can be read: On which channel the station operates, what is its signal strength, what neighbour channels are available and what their signal is strength. These data are often indispensable for the correct installation of the antenna.

## *5.1. Antenna installation for modems*

Good placement of antenna is required for good function. Important factors are GSM cell signal strength and signal quality. Signal strength could me measured by function „GPRS receive signal strength measuring“ in program Radwin.
Second part is quality of signal. There is no exact measurement. Good point of view is from data transfer statistic. If number of lost packet is low, signal quality is good.

## *5.2. Good quality GPRS requirements:*

- serving cell signal better than –90dBm,
- adjacent cell signal below 12dB to serving cell, otherwise risk of interference,
- if many cell with close signal levels (<3 dB), be in danger of reselection (switching between cells, that caused bad time response or communication interruption). In this case is needed to extend difference between signals.

## *5.3. Example, station received these signals:*

Serving Cell

| chann | rs | dBm | PLMN | LAC | cell | NCC | BCC | PWR | RXLev | C1 |
|---|---|---|---|---|---|---|---|---|---|---|
| 107 | 18 | -77 | 23001 | 352A | 6E91 | 5 | 6 | 33 | -106 | 29 |

l Dedicated channel
l chann TS timAdv PWR dBm Q ChMod
l No connection

| chann | rs | dBm | PLMN | BCC | C1 | C2 |
|---|---|---|---|---|---|---|
| 76 | 18 | -78 | 23001 | 1 | 28 | 28 |
| 106 | 17 | -79 | 23001 | 3 | 27 | 27 |
| 33 | 17 | -80 | 23001 | 7 | 26 | 26 |
| 77 | 14 | -85 | 23001 | 3 | 21 | 21 |
| 30 | 14 | -85 | 23001 | 1 | 21 | 21 |

**What does it means:**

- module received cell 6E91 on channel 107 with level –77dB,
- there is possible to interference from channel 106, with level –79dBm,
- there is possible to reselection between channels 76, 106, 107 and 33, its level is so close.

**Way to fix**

Change type (from unidirectional to directional – e.g. yagi), direction or place of antenna. After changing you must do measurements again.

## 5.4. Method of signal measurements

Run Radwin, function “GPRS receive signal strength measuring”. Answer is information about serving and remaining cells. Output is from AT commands AT^MONI and AT^MONP from GPRS module.

## 5.5. AT^MONI command meaning

*Serving Cell:*

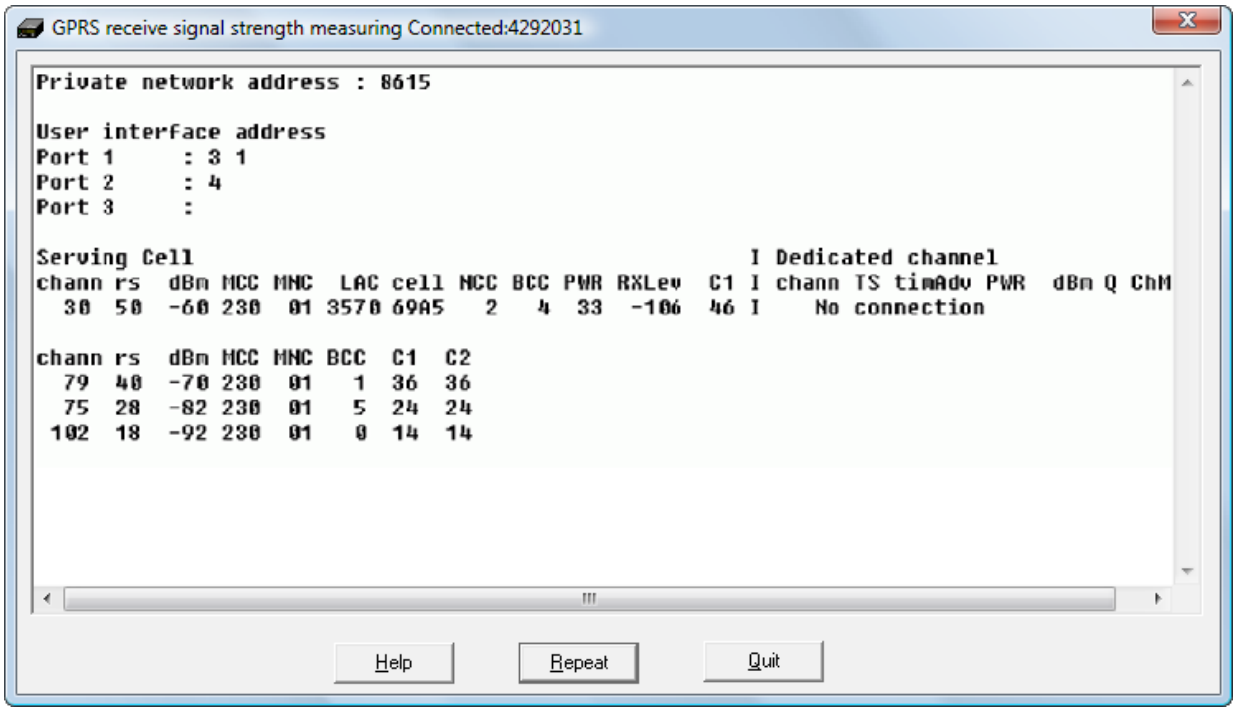
| Item | Description |
|---|---|
| **chann** | ARFCN (Absolute Frequency Channel Number) of the BCCH carrier |
| **rs** | RSSI value 0 . 63 (RSSI = Received signal strength indication) |
| **dBm** | receiving level of the BCCH carrier in dBm |
| **PLMN** | PLMN ID code |
| **LAC** | location area code |
| **cell** | cell ID |
| **NCC** | PLMN colour code |
| **BCC** | base station colour code |
| **PWR** | maximal power level used on RACH channel in dBm |
| **RXLev** | minimal receiving level (in dBm) to allow registration |
| **C1** | coefficient for base station selection |

*Dedicated channel:*

| Item | Description |
|---|---|
| **chann** | ARFCN (Absolute Frequency Channel Number) of the TCH carrier<br>Note: **<chann> = h** indicates frequency hopping. |
| **TS** | timeslot number |
| **timAdv** | timing advance in bits |
| **PWR** | current power level |
| **dBm** | receiving level of the traffic channel carrier in dBm |
| **Q** | receiving quality (0.7) |
| **ChMod** | channel mode (S_HR: Half rate, S_FR: Full rate, S_EFR: Enhanced Full Rate) |

## 5.6. AT^MONP command meaning

| Item | Description |
|---|---|
| **Chann** | ARFCN (Absolute Frequency Channel Number) of the BCCH carrier |
| **rs** | RSSI value 0 . 63 (RSSI = Received signal strength indication) |
| **dBm** | Receiving level in dBm |
| **PLMN** | PLMN ID code |
| **BCC** | Base Station colour code |
| **C1** | coefficient for base station selection |
| **C2** | coefficient for base station reselection |



# 6. Optical sensors installation

Optical sensor set to flowmeter Sensus (Meinecke or Spanner - Pollux) for scanning of the IS2-12 flow by following way:

## *6.1. Flowmeter WP, WS type*

1. Safety screw screw out in place of joint cover.
2. Gold cover uncover.
3. The cover frame lift slightly on side of joint cover and at the same time the frame is turn to left when two tongues are free from bayonets pits on the bottom side of the frame in the flowmeter body.
4. The optical sensor set to fishtail by cable down on transparent chassis of gear box.
5. The sensor cable one turn round bottom border of gear box and lead out by one from two rough channels on body of the flow meter, on side of the safety screw.
6. Repeatedly the cover frame set to bayonet (attention on nip cable off).
7. Screw up the screw in place of joint cover.
8. The cover cover up back, herewith stop crossluminance to sensor.

## *6.2. Flowmeter WPD, WSD type*

1. By the screw driver break out rough window on the side of flowmeter head, box knife to get rid of burrs .
2. Turn the blue plastic collar, black head to the meter to the left to achieve that locking knob on the collar outside the box for the sensor (right of him).
3. Infrasenzor attached oblique projections on its upper edge of the upper edge of the box and meter enclose (back of the sensor down) into the right position to meter.
4. Turn the blue plastic collar, black head to the meter to the right will deliver the sensor that is recessed locking collar meter fits into recess at the bottom of the sensor.
5. The cover cover up back, herewith stop crossluminance to sensor.
6. When removing do everything in reverse order, ie. turning the collar on the left trigger the sensor, the fork up and get away from the upper edge of the meter box.

# 7. References

[1] Conel s.r.o.: *Application CGU Server*, 2004

[2] Conel s.r.o.: *ARNEP Protocol description*, 2005

[3] Conel s.r.o.: *RADWIN Programme for control AGNES*, 2008

[4] Conel s.r.o.: CIO 2 – *Users manual*, 2008

# 8. Links to related products of the manufacturer

Related products and materials with a reference can be found on the manufacturer's website – Conel company:

www.conel.cz

There are another links on Siemens company website, MC39i module:

www.siemens.de

www.siemens.com

## 8.1. Systems

**AGNES** – Advanced GPRS Network System – represents a solution for private data network structures for industrial applications and technological systems.

## 8.2. Protocols

**AGNEP** – Advanced GPRS Network Protocol – one of the AGNES system protocols.

## 8.3. Software

**RADWIN** – the software provides for creation, installation and administration of AGNES system GPRS data networks.

## 8.4. Products

**CGU 04** – GPRS modem.

**CGU 04i –** GPRS modem with sleep mode.

**CGU Server** – hardware and software equipment connecting AGNES system and company LAN with the possibility of GPRS network control and diagnostics.

# 9. Product disposal instructions

The WEEE (Waste Electrical and Electronic Equipment: 2002/96/EC) directive has been introduced to ensure that electrical/electronic products are recycled using the best available recovery techniques to minimise the impact on the environment. This product contains high quality materials and components which can be recycled. At the end of it's life this product MUST NOT be mixed with other commercial waste for disposal. Check with the terms and conditions of your supplier for disposal information.

# 10. Complaints procedure

**Dear customer,**

The product you have purchased had passed manufacturer's tests and its functions had been checked by our technician before sale. In case any defect shows up during the guarantee period that prevents normal use we ask you to follow the Complaints procedure when registering your claim.

To make a possible complaint procedure easier please make sure when taking over the product your vendor has duly filled in all the relevant parts of the warranty, including date, seal and signature.

This complaints procedure relates to the purchased products. This complaints procedure does not relate to the services provided.

**Guarantee period of the products**

Guarantee period of 24 months from the date of purchase is provided for the device, source, antenna, data cable and possible accessories. The date of purchase is at the same time date of takeover.

**Registering a claim**

It is necessary to register your claim at the vendor where the subject of the complaint has been purchased. The customer shall present duly filled warranty and the complete subject of the complaint. Subject of the complaint shall be presented in a condition adequate to that at the moment of purchase.

**Caution!**

The vendor is not responsible for keeping default settings or data saved in the subject of the complaint.

The customer is obliged to clarify the defect or how it is displayed and what claim he intends to register.

**Processing the complaint**

The vendor shall provide a free remedy depending on particular conditions, or replace the subject of the complaint for a new product, or settle the matter in another manner in compliance with the Civil Code and the Act on consumer's protection.

As of the moment the claim is registered by the customer and the subject of the complaint is taken over by the vendor the guarantee period stops running. The guarantee period continues on the date of takeover of the repaired subject of the complaint or replaced faultless product by the customer, or should it not be taken over on the date the customer is obliged to take over the repaired or replaced product. In case the vendor replaces the subject of the complaint for a new product (including IMEI replacement) the original subject of the complaint becomes property of the vendor and the new product becomes property of the purchaser. Since takeover of the new product a new guarantee period starts. In the cases when the vendor settles the matter after agreement with the customer by replacement of the subject of the complaint for a faultless product the new guarantee expires.

1. After 12 months since the replaced product was taken over by the customer.

2. On the date when the original guarantee period (subject of the complaint) would have expired should it not have been replaced, whichever comes first.
3. The claim is deemed unsubstantiated when the defect is not found by the vendor processing the complaint or the defect is not covered by the guarantee under Article 3 of the procedure.
4. In case the claimed defect is not found and functionality is proven to the customer, the customer is obliged to pay demonstrable cost related to expert assessment of the claimed defect.
5. In case defect is found when processing the complaint that is not covered by the guarantee (extra-warranty repair), the vendor shall inform the customer and the customer shall inform the vendor whether he/she wishes to have the defect repaired for the price set. A protocol shall be made on exact conditions of the extra-warranty repair and signed by both the customer and the vendor. Should the customer not require remedy through an extra-warranty repair under the conditions, the device shall be returned to him/her after he/she pays the demonstrable cost of expert assessment.

**The guarantee does not cover defects incurred due to**

1. Mechanical damage (fall and the like).
2. Use of inadequate, or not recommended sources and other accessories.
3. Connection of the product with non-standard accessories.
4. Installation or use of the product conflicting with the Manual or use for other purposes than usual for this type.
5. Improper manipulation, or an intervention of unauthorised person or other service than authorised by the manufacturer.
6. Effects of natural forces (flood, fire etc.) or other local phenomena (storm, overvoltage and the like).
7. Storage under unauthorised temperatures.
8. Operation in a chemically aggressive environment.

**Other conditions**

The fact that the subject of the complaint does not conform to parameters set for other similar product types shall not be considered a fault. To assess whether it is a case of covered fault the parameters stated in the technical documentation for the product are decisive.

The guarantee expires in any case of changes to the subject of the complaint, or damaged or otherwise unreadable serial number.

# 11. Warranty

| | |
|---|---|
| **Device type** | |
| **Serial number** | |
| **Guarantee period (months)** | |
| **Vendor** | |
| **Date of purchase** | |
| **Seal of the vendor** | |

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Date of complaint registration | | | | | |
| Complaint protocol number | | | | | |
| Date of reception of the device in repair shop | | | | | |
| Date of finished repair | | | | | |
| Number of repair sheet | | | | | |
| Warranty repair | | | | | |
| New serial number of the device (IMEI) | | | | | |
| Notes | | | | | |
| Seal of the repair shop | | | | | |



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